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A Tour through Kamraj—Kashmir.

After a month spent in Srinagar during which I had been endeavouring to make myself acquainted with the present state of affairs in forest matters, I was at length able to leave for my first tour in the forests. The Kamraj District was chosen to start with, as it contains the famous Lolab and Utr Machhipura valleys in which were said to lie the best forests. These valleys are situated to the N. W. of Srinagar and the easiest way to reach them is to drop down the river in boats, known as *dongas* to Sopor (Shivpur) or some point near and march from there. I did not take this latter route, as I wished to see all the forests in the District. The *donga* requires merely a brief description; it is a long, narrow and shallow flat-bottomed craft with bow and stern slanting upwards from the main hull, both being narrowed to a point. A frame work of light poles is fitted on the hull and on this mats are placed to form roof and side walls. The whole can be lifted out and the sides rolled up. The traveller occupies nearly the whole of the hull, a small space being left at the stern for the boatmen and his family, in which there is invariably at least one baby in the crying stage! Another such craft is hired for the servants and luggage and then the traveller is equipped for Kashmir boat life. Having arranged all this we left Srinagar very early one morning at the end of July; we floated slowly down the Jhelum enjoying the lovely air and scenery, past the Munshi Bagh where dwell the Europeans, and past the shops where the said Europeans are supplied with canned goods as our friends the Yanks call them, more or less fresh at more or less exorbitant prices. Then the Lal Mandi comes in sight, a handsome building seen from a distance, but one that will not bear close inspection; the rooms are fine and well suited for the entertainments for which the building was erected, but the decorations on the walls and the coloured glass globes are not of a high order of art. Next [illegible] leave behind the state Hospital and passing under the [illegible]ira Kadal or principal bridge, the State Council House and [illegible]ces come in sight. The bridge is a wonderful structure on

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the cantilever principle, too well known to need description. It is amazing how long it has lasted and the builders of old evidently knew or did their work much better than their modern brethren, for while the Amira Kadal has stood for many a long year and looks as if it would never get any more rickety than it is at present, two new bridges made last year over the river, near Islamabad have both been carried away by a flood which swept down during August and simply floated them away. The new palaces are to be of modern European architecture and will be substantial, handsome buildings, but will take a long time to complete, judging from the present rate of construction. Raja Sir Amar Singh, the President of Council, has built a very handsome little summer house for himself, just below the palaces, but here also there are grass green tubs and marble top tables in the garden which somewhat jar upon one's nerves. After the palaces, comes chaos, otherwise the dirtiest, smelliest, most tumble-down city in the world, reminding one of the pictures of Old London Bridge in one of Harrison Ainsworth's novels. About midway down is the principal ghat which leads to a square called Maharajgunj; here dwell the persuasive silver, copper, and shawl merchants. A warning must be given against any one going here to buy, it is far better to get the name of a good man and let him bring his wares to the house. The silver-work is beautiful, the pattern most appreciated being the lotus flower. These men must do a great trade judging from the orders in their books; and here, be it noted, that Kashmir is, above all, the country for chits, every one from the Thasildar down to the lowest boatman asks for a *razinama*; and a mighty pest it is, especially so when, as happened to me, one is given saying everything had been beautifully arranged, only for us to find it the very reverse after we had started, but still the certificate remains to be shown to others. The copper-work next demands attention, the work is most artistic where they have kept to Oriental patterns; when new, a copper tray is a thing of beauty but it very soon tarnishes and though the merchants say it can easily be cleaned, the general verdict is that it cannot be done satisfactorily. After Maharajgunj more dirt, smells and tumble down houses as we drift slowly down the busy river studded with boats of all kinds from the tiny *shikari*, holding one or two people, the *donga* for travelling, up to the huge *kishti kalan* capable of containing many hundreds of maunds of *shali* (paddy,) with a house at the stern in which the boatman and his family are born, grow up and die, for they are entirely a floating population and possess no home on land. They have a hard life these boatmen, their food being apparently rice of a poor description and Singhara nut, but still they are a fine strong race and as far as one can see through the dirt, not bad looking. Like most Kashmiris they are very unmanly and a huge male creature will break out into the most womanly shriekings on a very small provocation.

At last we leave the city behind and emerge into a flat unlovely country only redeemed here and there by a beautiful grove of chinar trees. One hears boat life very differently spoken of, some praise it as the most luxurious life possible, others say the very reverse, my experience inclines me to the latter view. To begin with, the boat swarms with fleas so that a liberal supply of insect powder is indispensable if any rest is to be expected at night. Then there is hardly room to move about and to wind up with, the boatman and his family live at the stern and when they want to cook their food the traveller is simply smoked out. In the day time if the weather is fine it is indeed most pleasant, but it soon gets terribly hot especially on the Wular Lake; and towards sunset, life is made a burden to the traveller by the myriads of ferocious mosquitoes which pursue him as long as he is on or near the lake. So we float along till we cross the Wular Lake and make Sopor, a great fishing resort, but not an inviting looking town to stay at; we pass rapidly under the bridge and urge the men to work hard as night is approaching and our destination is Duabgah, vulgarly known as Dobgam, a few miles below Sopor, this being the great firewood and timber depôt for the forests below Srinagar. It is dark when we arrive and as it has been raining, the ground is a swamp and we experience an hours misery while the tents are being put up, for cooking is going on in the boat and the mosquitoes swarm outside; not at all a nice place is Duabgah at the end of July after a heavy fall of rain. We are up betimes next morning after a cool night, which we spent in the boat, made lively by fleas, and mosquitoes. I then take a survey of the first Kashmir timber depôt which I have seen and luckily no expectations of order or regularity had been formed, so there was no disappointment. The old lines "The British fleet thou cans't not see for 'tis not yet in sight," came to my mind for the depôt proper contained no timber, that was all lying in the Pohru river which joins the Jhelum at this place; nor is it ever taken out and landed here, but without being numbered or registered is taken on in boats or rafts to Srinagar. What the depôt contained was a sight not to be seen in the Punjab, *viz.*, thousands of short logs of deodar, kail (called kairu here) tos (ré), rai (budlu) standing on end and closely packed together, ranging from 4 to 7 feet in length. This is not used for building purposes but for firewood, and an enormous quantity of it is yearly consumed in the city. The old system was that the *hanjis*, that is boatmen, simply went into the nearest forest, cut what they liked, brought it to the waterway and then conveyed it to this depôt. Here the weight was estimated, then the state share, one fourth, deducted in kind; the balance remaining the property of the *hanjis* who took it into Srinagar for sale The one fourth state property was also taken to the city and sold for the benefit of the state government. There is also another method in which all the timber is state property, the *hanjis* cut in the

forests and bring to this depôt and are paid at a fixed rate of so many *Kharwars* per rupee (a *Kharwar* is some seers over two British maunds) this too was estimated and the boatmen knowing that they were to take it into the city afterwards and sell it for the State, used to understate the quantity and sell the excess on the road. In fact, arrangements in the past have been what might be expected under the circumstances. The boatmen will now be initiated into the mysteries of cubic measurement. The deodar logs are of excellent quality and should never have been cut in such short lengths; in Jhelum they will sell for more than four times what they would fetch as firewood in Srinagar; they will now be launched and sent down to the plains together with some hundreds of the best kail logs. In this depôt were found a couple of thousand broad-gauge sleepers cut some twenty years ago and nothing done with them! As very many of them were in good condition, all have been launched for Jhelum; the highest price obtainable here was 4½ annas and they can easily be sold for perhaps 12 annas to Re. 1 each below. The next thing to look at was the timber in the river and it was astonishing to find that the greater part of it consisted of long poles under 3 feet in girth, hardly ten per cent being really logs. This of course could only mean that young trees were being felled and such was found to be the case when the forests were examined; a most lamentable waste of timber. This is all taken in to Srinagar for sale; there are some 30 different names for this timber, not the simple classes of British depôts. Thus a *Shahtir Kalan* is a round piece of timber about 35 inch long by 36 inches girth; *Shahtir rasami* 30 feet long and 30 inch girth; *Shahtir nim* 27 feet long 30 inch girth and so on. Here can also be seen some of the enormous *Takhta* used in boat building, they run to 70 feet in length by perhaps 3 feet in breadth and 4 inches thick, two of these are cut out of one tree. The men use axes for this purpose, long and thin, they cut as deeply as they can down the length of the log till they reach the centre, then turn it over and repeat the process till the cuts meet; the outside slabs are hacked off in the same way and the *Takhta* cleaned with an adze. After this it has to be dragged with much labour from the forest to the water way. This boat building question is a most serious one, for the number of boats plying on the river and lake is prodigious and what the people will do when they are no longer allowed to cut first class trees into planks it is difficult to say. They do not understand the use of the saw and even if they did, the cost of building a boat of sawn planks would be very high compared with the present method, but change they must for the forests cannot now contain many large trees, seeing that unrestricted fellings have been going on for generations past, and those that are left must be most carefully dealt with.

J. C. Mc D.

(To be continued.)

Sledge roads in France and in India.

DEAR SIR,

I send you a translation of a paper on Sledge Roads by M. Jolly in a late number of the "Revue des Eaux et Forêts," because it seems to me to contain many points of great value to an Indian Forester. So far, in India, the cost of labour being so low has restricted sledge road construction to main arteries and that being so it has been found advisable to build them strongly while about it. I cannot but think, however, that experience would shew that we might with advantage proceed a step further—though not so far as in France—and make sledge lines down accessory valleys of moderate size that it will take, say three years, to work through. And it should be recollected that the mere saving in money is by no means all the advantage to be had from such export works—there is the saving in time, a great consideration, and comparative independence of the coolie supply market (often also of considerable moment in distant parts). I believe a great deal more may be made of the forest means of transport so long in use in Europe (especially in obscure corners of Europe, where labour is probably cheap) than is made, though at the same time it is certainly exceedingly essential to recollect the strong tendency a keen forester feels to go in for "jims" of the kind. He may throw a lot of money away, but then again he may introduce a means of immense economy, I think the larger sum is more likely to be on the side of the economy.

"Q."

TRANSLATION OF A PAPER ON "SLEDGE ROADS" BY M. JOLLY

in the "REVUE DES EAUX ET FORETS" of the 10th March, 1891.

In mountains more than elsewhere, means of export constitute one of the chief factors in estimating the value of woodlands. The works undertaken in order to improve these means of export in the Government forest charge of Senones aim at reducing the cost of transport and maintenance not by means of a perfected system, but in the rational use of the old methods of the country.

These forests, of which the altitude varies from 340 to 930 metres (about 1,100 to 3,000 feet) form a block of 5,171 hectares (13,020 acres) situated on the Vosges Sandstone. The rock is not good metalling and the maintenance of metalled roads is consequently very expensive. Trap, only found in distant quarries, does not cost less than 10 francs the cubic metre on an average. Consequently, the forest roads scarcely penetrate except into the main valleys. In the secondary valleys, carts go over the natural surface: the smallest cart road would necessitate exaggerated expense both for construction and maintenance.

How then are we to ensure satisfactory communication at small cost, from the fellings to the pucka roads? After making experiments, the most practical plan has been found to be Sledge Roads.

As we know, what has to be done is to load up the wood on the sledges, which men guide, augmenting or moderating the rate of speed according to circumstances. These sledges, which are built to carry relatively large loads, are made of very well-seasoned beech by the sledgemen themselves, the component parts being fixed together by trenails. They can carry all kinds of material: logs, planks, scantling or fuel.

The logs intended for sawing are converted, some to order, others, according to the ancient usage of the Vosges, into lengths of 4 metres (just over 13 feet). The latter are sledged in the "bouc" sledge or the "large sledge." The "bouc" (fig. 1) is short and only carries one end of the log* which is first slightly notched so as to catch on to the sledge properly. It is fixed in firmly with a chain finishing in an iron wedge driven into the bark.†

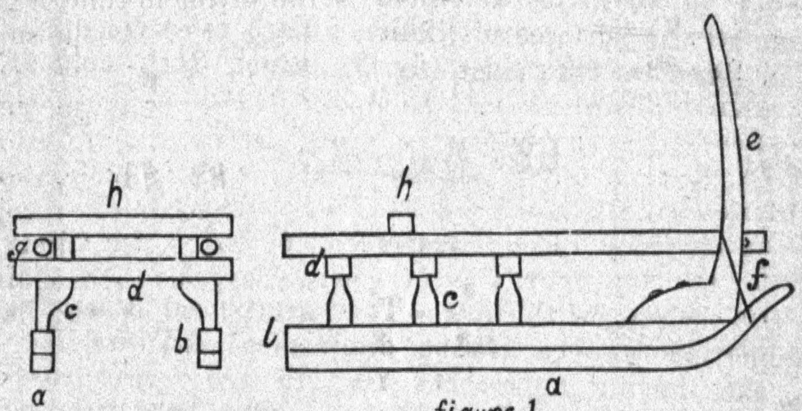

Figure 1.

The average load of a "bouc" is about 40 planks. To bring very large logs containing perhaps 60 to 80 planks, several men are often employed directing the "bouc."

One can in this way negotiate slopes varying from 50° to 20°; since the "bouc" only carries one end of the log while the other end drags on the ground, which gives considerable friction. Towards 20° it becomes necessary, in order to make the sliding easier, to cover the soil with small branches and twigs.

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*—*a.*—Sole; *b.*—runner; *c.*—log; *d.*—transverse; *e.*—handle; *f.*—binding with iron wire; *g.*—a fir pole; *h.*—upper fir transverse. Fig. 1, is to a scale of $\frac{1}{20}$ fig. 2, 3, and 4 an to a scale of $\frac{1}{40}$.

A "large sledge" weighs about 40 Kilog, (88 lbs.) and cost 18 francs; a "bouc" or fuel sledge weighs 20 Kilog. (44 lbs.) and costs 8 frs.

†In this way neither the notch nor the wedge are any objection; scarcely a trace remains after the axe has been applied preparatory to sawing. In any case, nothing but the outer slabs, which are of small value, would be injured.

When the slope falls below this figure and remains below it, sledging with the "bouc" is not practicable. In that case one substitutes for the friction of wood on earth the lesser friction of wood on wood. With this view the logs are loaded out a sledge of sufficient length,—the "large sledge" (fig. 2) intended

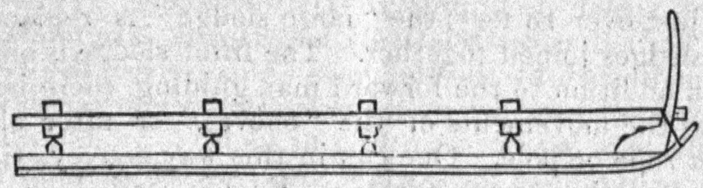

figure 2.

to glide on cross-pieces spaced on an average 0·60 metres (23·4 inch) these cross-pieces an called "ravetons." The sledge ought to press equally on all the cross-pieces, and consequently the placing in position is carefully done. Two long pieces, fixed at the same distance apart as the soles of the sledge, are used to regulate, according to a succession of regular inclines, all the surfaces of friction. Each cross-piece is firmly fixed in place by two pegs (fig. 3), which both hold it and

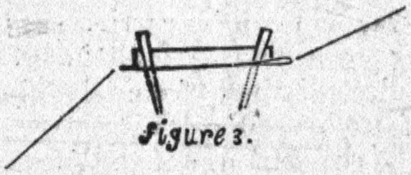

figure 3.

keep the sledges on the line. They are placed nearer together in proportion as the incline diminishes, and are far apart when the incline approaches 20°; in the latter case they simply consist of small branches and give but little support to the sledge, which scrapes the ground in the intervals. If the incline becomes less stiff "lattes de rebût," split fir, or "rais de sapin," are used; yet less steep, and one uses "quartiers de hêtre"* and if it is very slight, one harnesses bullocks to the sledge. Should the slope be considerably pronounced throughout the length, the sledgemen are careful to furnish their sledges with soles of soft green wood; while well-greased soles of dry wood are useful on mild inclines. Alternations of dryness and damp, although less marked in forests than elsewhere, have nevertheless a great effect on the sliding. Fine weather eases it, so that on stiff inclines the pace of the sledge increases, while, on the other

*Generally one uses "rais de sapin" between 15° and 7°; "quartiers de hêtre" are used wnen the incline remains steadily for some distance below 6°. This last year, a wood merchant has constructed, in order to get over a ridge, a bullock sledge road with cross-pieces of beech He has thus brought up 1,500 stères (22,280 c. ft.) of fuel The slopes vary from 3° to 11° on a length of 1,200 m. (3,936 feet.)

hand, the effort required to draw the sledge is also easier on the slighter gradients. Naturally, rain has the exactly reverse effect.

Like the "bouc," the "large sledge" receives about 40 planks, similarly also, when by reason of the load or the gradient the effort required becomes excessive, several men are necessary to bring down one sledge. If the length of the logs is more than 4 metres (just over 13 feet) the "large sledge" is replaced by a couple of sledges joined together. The front sledge is an ordinary "bouc." In addition to the forward man guiding, there is a second who guides the movements of the "chèvre," or after sledge, by means of a rope or pole. One can in this way convey timber of all lengths, whether sawn or in log. Fuel is carried on a sledge with four uprights (fig. 4) between which it is piled. It can be

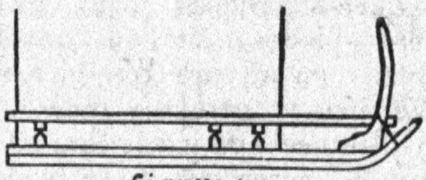

figure 4.

used on any gradient, but while with cross-pieces nearly two "stères" (70·6 c. ft.) can be carried, it often happens that scarcely half a "stère" (17·7 c. ft.) can be carried on "bouc" roads.

In fact sledging over the ground itself with gradients of from 50 to 20° is quite distinct from sledging over cross-pieces with a gradient of under 20°. This latter requires generally regular roads built at the expense of the owner of the forest, while the former requires nothing, but a slight expenditure that the exporter can always himself manage. The sledgemen themselves mark out the "bouc" roads, simply removing the rocks and using the hoe a little. On the other hand a sledge road made with cross-pieces, requires a regularly levelled road at least 1·20 metres (3·94 feet) wide, so that it necessitates an immediate expenditure that an exporter will never wish to incur, in addition to the fact that a single year's use of it will not always repay him. Consequently the cartmen go beyond the metalled roads to cart over the natural ground of Vosges sandstone however wretched it may be.

It is true that some sledge roads exist, but they were marked out without any method and without any other care than the requirements of the moment. They are therefore generally defective and do not present all the advantages which, had they been properly conceived, they would have done. During the last four years the attempt has been made to construct then in a more rational manner. The roads undertaken during this period are of two kinds.

The first traverse the secondary valleys and end in the principal valley at the metalled road. It frequently happens that the valleys present gradients suitable for sledging with cross-

pieces, but are too slight for the "bouc." As long as a sledge road is made, then the cartmen are simply obliged to go up these valleys to get the wood where the "bouc" has stopped. It is only their passage which, after a long lapse of time, has marked out a few tracks taking the place of roads. Carriage is very difficult, rocks alternate with holes and the soil presents such inequalities that were the loads put on the carts above the axles they would not be sufficiently stable. Consequently they hang them below the axles with chains and iron wedges. These wedges are driven into the wood deeply at the ends, causing damage to several of the planks which are eventually to come out of the log, and in consequence they are sold off cheaply. This loss may be estimated at 10 fr. per thousand planks. As to "paunes" and "chevrons," they are dragged by a chain; fuel can only go out in smaller quantities. Finally, since it would be impossible to remove pieces of great length, such are not extracted in this sort of place. It is almost only along the roads that these can be worked out without difficulty and inconvenience. On slopes, in fact, without sledge roads with cross-pieces, it is impossible to sledge them; one can only roll them down, guiding them more or less with levers; one sledges with the "bouc" small scantling and logs of 4 metres. The exaggerated use of the "bouc" instead of the "large sledge," and particularly rolling, cannot be done without considerable damage to the standing trees. In order to avoid these methods, a regular sledge-road traced along the side of the slope is requisite. Cutting across all the "bouc" tracks, this hillside road collects the outturn of everything above, which it brings to the road in good condition. Throughout the ground traversed it allows of the removal of long pieces. If it can end in a saw-mill it has besides the advantage of a direct carriage without transhipment.*

The first attempt was made in 1887, with this view. A hill-side road was then begun at a uniform gradient of 14° on the North slope of the "Bouton." At 0·50 frs. the running metre, the cost of cutting came to 412·50 frs. (£16 to £17). The "large sledge" partially substituted for the "bouc" and for carts, has produceda saving of 18 frs. on a thousand planks. The number. of planks so exported during the last few years has been 26,000, so that up to date the saving has come to 468 frs.†

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*These hillside roads would replace advantageously the working plans lines which follow the steepest course and when so marked out are without utility either for export or even inspection.

†Since writing this, this they have just finished, in that neighbourhood, a sledge road 2,395 metres long (8,056 feet). From the ridge the logs are brought straight to the saw-mill at 100 frs. per 1,000 planks; formerly the cost was 170 frs.; 80 frs. sledging with the "bouc" and 90 frs. cutting.

(One franc = $\frac{4}{5}$ shilling.)

In 1888, it was necessary to make arrangements for exploiting four lost marked in the Canton des Tendelins, estimated at 53,000 planks. The road made for this ramifies through a length of 1,096 metres (3,595 feet) in the valleys of L'Homme tué and des Tendelins. The cutting cost 493·20 frs., or 0·45 frs. the running metre. Formerly the cost of transport to the saw-mill per 1,000 planks was 120 to 125 frs., this has been reduced to 100 frs. through the institution of a sledge-road with cross-pieces for carting over natural ground. If besides, one counts the 10 frs. made by no longer loading carts underneath, the saving rises to 30 frs. per 1,000 planks, and on all the four lots to 1,590 frs. Then the Tendelins sledge-road serves an extent of 30 hectares (74 acres) and will have to furnish for a long time to come, important products, of which 100,000 planks have to be turned out at short notice.

This being permanent, roads have to be laid out with care For hill-side roads one adopts a gradient as suitable as possible to sledging and throughout the length of the road, it is kept nearly uniform. The effort exerted by the sledgeman appears least at about 12°; this gradient should correspond to the co-efficient of friction of the moving sledge on the cross-pieces. This is the best, but if the fact of its being necessary to serve some particular area of the hill face to come out at some fixed point, obliges us to change this gradient, we can, according to circumstances, force it up to 15° or reduce it to 9.° We can scarcely go beyond these bounds. In fact, every sledge-road thus regularly built for using the "large sledge," is a circuit compared to the line necessary for the "bouc," which can descend much steeper slopes, and if the former does not repay its greater length by much greater ease of transport, the sledgemen will refuse it and will be always cutting across with the "bouc."

For the roads along the valleys (chemins de fonds) it is a different matter. There, the question of gradient is encumbered by the necessity to serve the two hill-sides. The ravine must be followed as closely as possible, so that the first point to be considered is how to run the line so as to continually serve the two slopes, the one thing to be careful about being to avoid floods. It is generally sufficient to clear out the bed of the stream, hollowing it out in places, and to protect the embankment of the road with rocks dug out when cutting it. The levelling has scarcely any other use than to see whether or not sledging is possible. On the other hand, the levels determine the direction of a hill-side road, so that in this case one practically takes a given gradient and follows it down the hill-side.

As to the specification of such a project it is as simple as the actual laying out on the ground. Below we give one for a sledge-road projected this last year: Breadth 1 m. 30 (4·3 feet) and longitudinally the slopes to be as follows:—

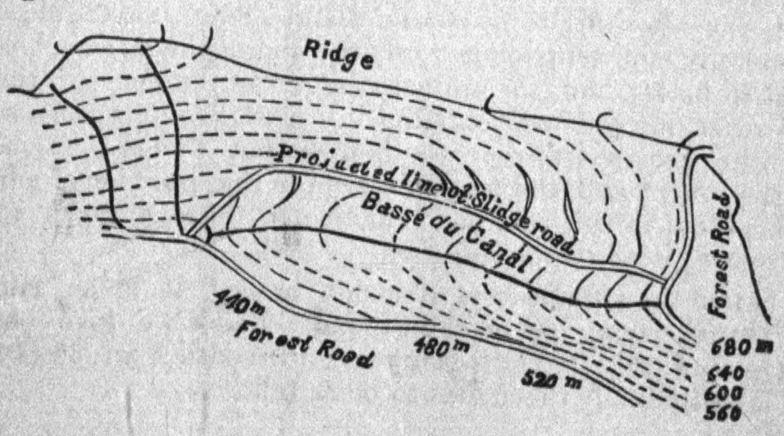
		metres.			metres.
18 °	on a length of	38·50	22 °	on a length of	60·00
15	„	23·00	12	„	182·80
12	„	32·50	8	„	134·70
13	„	29·00	12	„	34·50
14	„	26·50	14	„	50·00
13	„	32·00	15	„	106·90
16	„	35·50	13	„	104·50
13	„	204·10	11	„	98·50
14	„	26·50	12	„	45 60
13	„	41·00	11	„	142·10
19	„	62·00	9	„	32·00
16	„	39·40			
21	„	26·40			1609·00

1 metre = 3·28 feet.

1,609 metres @ 45 centimes the running metre = 724·5 frs
5,278 feet @ 4½d to 4¾d ... = £ 28-8.

To this price, which is that of the earthwork of the roadway, we should add the cost of making and placing the cross-pieces. In one day, for which he receives 5 frs. (nearly 4 shillings), a sledgeman can use a "stère" (35⅓ c. ft.) of "raisde sapin" to serve as cross-pieces for a length of 50 metres. The value of the wood fashioned and carried is at the outside 5 frs., so that per running metre the cost is $\frac{5\times2}{50}$ = 0·20 fr.

If the cost of construction of roads of this kind is so very low, that of maintenance is not less so. The roadway suffers no wear and tear, and, thanks to the cross-pieces, the rain does not cut it up, forming as these do a succession of small "pankaltahs." A bank of earth becomes formed over them and the rush of the water is stopped. After a few storms the original slopes are replaced by a series of steps of which the profits remain uncharged. In fact the maintenance merely consists in changing the rotten cross-pieces. Their life is from 5 to 10 years, say 7 years; consequently the annual cost of maintenance is per running metre $\frac{0·20}{7}$ = 0·03 frs.



Such a project as the above includes no special works and should require, on the longitudinal section, very slight changes of level. It is under these conditions that the sledge-road is economical. We must profit by this flexibility which allows us to turn and twist with the natural ground, crossing it as we find it without expensive works. The moveable tramway is no doubt much more seductive, but in the first place, it costs, at the least, 3 or 4 frs. per running metre as cost of original construction. In the second, the traffic must be very brisk to cover the capital employed. Finally, traction on iron can only to done within relatively limited gradients. These restrictions go to shew that if such means of transport is applicable in a forest it would be rather on the principal arteries than in the secondary ramifications. Then, on the other hand, the sledge-road is in its true place as far as mountains are concerned. Let us not neglect it as too primitive; let us make as much use of it as possible.

Practical Forest Training Grounds for the Coopers Hill College.

In an editorial written presumably by Mr. Fernandez which appeared in the 2nd Quarterly No. of the Indian Forester, for 1890, at page 165, the question is raised whether preliminary practical training in a selected forest district in Germany should not precede the theoretical forest course at the Coopers Hill College, and I wish to discuss here the pros and cons of such a course, on general grounds; having done so, I hope to demonstrate that our Indian Forest probationers have now probably better opportunities for practical instruction in forestry than those of any other European Forest School.

During the first three years that men were trained in France for the Indian Forest service, it was arranged that after passing the qualifying examination for admission as Indian Forest probationers, they should spend six months in Alsace under M. Clément de Grandpré, *Inspecteur des forêts*, then in charge of the extensive forest of Haguenau in the flat country north of Strasburg between the Rhine and the first slopes of the Vosges mountains. This enabled us to learn a certain amount of forest botany, and to become accustomed to the French systems of management of Scotch Pine and Oak, beech, and hornbeam forests; and at the same time to improve our knowledge of the French language and of the customs of the country, all of which acquirements were extremely useful to us as a preparation for the

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In 1890, 10,605 metres of sledge-road (4,919 metres hill-side and 5,686 metres valley roads) were made, costing an average of 0·51 frs. per running metre for the earthwork. According to circumstances, the cost varied from 0·30 fr. to 0·65 fr.

subsequent course of forestry instruction at the Nancy Forest School. Whilst, however, I consider that six months could not have been better spent than in the manner arranged for us by Sir Dietrich Brandis, considering that we were to follow a course of instruction for our profession in a foreign language, although a better district might have been chosen than Alsace for increasing our knowledge of French; yet the case is different when men are to be instructed in their own country. It may then be a mistake to lay stress on the advantages of a preliminary training in forest work, before a student has studied the complete theoretical course of forestry. When we read, as in the article in the Indian Forester already referred to, that the Coopers Hill forest students should have a preliminary probation of some months in Germany, I must confess to being sceptical as to the necessity for such a plan. Opinions in Germany are much divided, on the question of placing forest students for a term of practical work in a selected forest, before their theoretical instruction has commenced; in fact, if the Coopers Hill authorities are wrong in not arranging for a term of practical forest work for our students, they err in very good company.

Since 1837, it has been the practice in Hesse Darmstadt that the practical course of forestry should follow, instead of precede the theoretical course, and surely no one is bold enough to maintain that the Prussian system which prescribes the opposite practice, can show better results than the well managed forests of Hesse Darmstadt, where forest officers, for the last fifty years, have been trained on similar principles to those now adopted at Coopers Hill; nor than the forests of Bavaria, Baden and Wurttemberg, where the same system is also in force. The idea of setting the practical before the theoretical course of forestry, chiefly arises from a sentimental hankering after old times, when forest students acquired most of their professional knowledge, under experienced practical forest officers, and merely superadded thereto a little theoretical instruction. Gradually, however, more and more scientific teaching has become necessary until, now-a-days, demands on a superior forest officer are so great that, if a student's theoretical studies are to be interrupted by a term of practical work, he may become unsettled and only able with difficulty to resume their thread afterwards. If moreover, on the one hand, lectures may be better understood by a student, after a term of practical work in the forests, on the other hand, there can be no doubt whatever, that the forester who has completed his theoretical studies, provided they have been sufficiently illustrated in the forest, will pick up the necessary practical knowledge in less than half the time the former will take, *cæteris paribus*, to do so.

It will interest old pupils of Clément de Grandpré to hear that after filling the posts of Conservator of Forests at Epinal and of *Inspecteur Général* at Paris, he is now residing *en retraite* at Versailles.

Every forest school should evidently have a sufficient area of forest readily accessible, where forest botany may be studied, and where lectures in sylviculture may be illustrated and practical instruction afforded in planting, sowing, thinning and other sylvicultural operations; also in measuring trees and in estimating the contents of woods. This, however, is quite a different matter from setting a student down in a foreign country, or even in his own, to follow practical work without having previously studied all the phases of present European forest management. The officer to whom he may be deputed, will probably be biassed in favour of a particular system of management, which may be admirably suited for that locality, but not for others. Any lover of forestry who has travelled in Baden, Wurttemberg or Saxony, will at once note how zealous the forester in Saxony is for clean fellings and artificial planting; in Baden, for the group system, and in Wurttemberg for the shelter wood compartment system of natural regeneration, largely supplemented by planting:—were an English Forest student to be placed in a forest district in any of these countries, before he has been taught in the lecture room to compare all the systems impartially, he might acquire such a prejudice in favour of a particular system in vogue in that district, as to impair seriously the benefit he should derive from a subsequent course of instruction, even in the best forest school in Europe.

An Indian Forest Officer may object to this assertion, on the ground that candidates for admission to the Dehra Dun Forest School are required to pass a season of probation in an Indian Forest, but this condition was arranged chiefly in order to ascertain whether such candidates were qualified for the Indian Forest Department, by love of outdoor pursuits, and by sufficient strength of constitution and active habits fitting them for hard work in the Indian Forests. Indian candidates are frequently fond of sedentary pursuits, and many of them dread the dangers and discomforts of a life in the forest service, and it is notorious that they generally make more efficient judges and pleaders, than active administrators in the land revenue, or Forest Departments.

This cannot be said of young Englishmen; our public schools, owing to the active sports which form such a prominent feature in English School life, turn out young men well fitted physically for the forest service. No candidate is admitted to the Coopers Hill College, for the Indian Forest service, unless he can walk twenty-five miles in seven hours, without showing undue sign of fatigue, besides having to pass strict medical examination at the commencement and end of his course; and to obtain a riding certificate, before he proceeds to India.

To make the case against setting practical experience before theoretical training quite general, I may compare our profession with that of medicine or engineering: though young doctors learn much from attending hospital cases, and engineers

from inspecting extensive works. under construction, yet it is not at the commencement of their studies that the former are set to work in a hospital, nor the latter on new railroads; at first they only attend these practical operations, after having acquired the necessary knowledge to understand the general drift of what is being done, and with a qualified professor at hand, to explain every step of the business. It is not clear why forestry instruction should proceed differently to that in other professions, and it no more follows that every practical forester is capable of teaching students, than that every medical practitioner and every railroad Engineer can do so.

In addition to the general grounds for rejecting the idea of a preliminary practical course of forestry in Germany, for our students, I hope to show that we have near Coopers Hill, and accessible to us in a short time by rail and steam boat, a great variety of forests, where we can impart the necessary practical instruction until the completion of our theoretical course; then in order to study Forest Management and Utilization more completely, our students make a prolonged continental tour in order to see practical illustrations of all they have learned in the class-room. It is a common idea that the woods near Windsor form merely a deer park, with a few enclosures for pheasants and rabbits. This is very erroneous, for inclusive of the Windsor Park of 5,000 acres, there is between Coopers Hill and Sandhurst, a distance of 15 miles, a total area 9,000 acres of forest under the administration of the Woods and Forests Department, besides a large area of private forests. The crown forest of Windsor, includes a well stocked oak wood of 1,100 acres, planted in 1816 for the use of the Navy; many other smaller plantations of oak, beech, silver fir, larch, spruce, scotch pine, chestnut and hornbeam, planted at different periods, and on the sandy heather soil extending from about two miles to the south of the College as far as Sandhurst, there are extensive areas under scotch pine with a mixture of Weymouth and maritime pines, all of which species reproduce themselves naturally in abundance, and are systematically protected ,chiefly in the dry months of March and April, against the forest fires which nearly every year burn over large areas of heatherland and scotch pine woods belonging to private owners adjoining the Crown forests. Eight hundred acres of this Scotch pine area, known as Cæsar's Camp forest, have been leased from the Commissioners of Woods and Forests expressly for the forest branch of the Coopers Hill College, and are being managed by Dr. Schlich according to Judeich's *Bestand-wirthschaft*, modified to suit the locality, which means that each compartment can be treated in accordance with its peculiar sylvicultural requirements, without insisting on a fixed annual yield. In this forest, the College has contracted to spend £300 annually, and this expenditure is disbursed under the following heads

	£
Forest Guard's pay ...	52
Plantations (about 30 acres annually.)	150
Fire conservancy, roads, &c., ...	98
Total	£300

No money spent on fellings or thinning is shown here, but all such expenditure is deducted from the sale proceeds of the timber, the balance being paid to the Commissioners of Woods and Forests. This little forest offers a fairly good site for the students to study plantations of Scotch and Weymouth pines, larch, Douglas and silver fir, beech and spruce and for noting the results of natural reproduction chiefly of coniferous species; also for observing the effects of under-planting Scotch pine and oak with shade bearing species and for making all the necessary measurements and valuations necessary for the computation of Working Plans. Within the grounds of the College, there is an area of 10 acres, where fine standards of oak, ash, and maple, sweet chestnut, wild cherry, and Scotch pine are growing over a coppice of hazel and other species and there is a forest nursery, where the material for the Cæsar's Camp forest plantations is raised, so that we have a constant succession of young plants to show the students. Another adjoining area has been subdivided into little plots on which oak, beech, hornbeam, alder, birch, larch, Scotch and Weymouth pines, silver and Douglas fir, and suitable mixtures of these species have been planted to illustrate the forestry lectures. Within a mile from the College, along the course of the river Thames there are extensive well managed osier beds, and at Esher, 12 miles from Coopers Hill, is a Crown coppice with standards of 800 acres, the coppice chiefly ash, oak, chestnut and hazel and the standards chiefly oak. This area is regularly subdivided into annual coupes and thousands of ash and chestnut saplings are planted out annually to improve the crop. In the Chiltern Hills, beyond Windsor, are any number of prime beech woods, and one of them near High Wycombe, belonging to the Hughenden Manor, is visited every year by the students. This wood consists of 160 acres subdivided into 7 necessarily equal compartments, in one of which the fellings take place annually according to the selection system, or *jardinage*; the trees being allowed to attain an approximate age of 90 years before they are considered mature, and the regeneration being entirely natural.

The Epping Forest is also visited annually by the school, consisting of an area of 5,300 acres, chiefly composed of hornbeam pollards, with large standards of oak, beech and other species. The pollards are frequently crowded to the extent of 700 to the acre, and as all pollarding has ceased since 1878, the growth of pollard shoots has formed a kind of tall Coppice growth commencing at 8 feet from the ground, and the future management of this extraordinary wood therefore presents many difficulties. There is also, in the Epping forest, a splendid thicket of 1,000 acres of oak,

beech and hornbeam, where the pollards had been all cut down more than 20 years ago, and which has now been to a large extent re-stocked by seedlings.

From the above description, it can be easily seen that a finer situation for the study of forest botany could not be found, for in the Windsor forest, oak, beech, elm, chestnut, hornbeam, ash, maple, larch, silver fir and spruce, and Scotch and other pines attain fine dimensions, and trees of all ages of these species are to be found. I think I am quite right in saying that every forest tree which has ever been planted in Great Britain is to be found within Windsor Park, or its neighbourhood, whilst our students supplement their studies of Forest Botany for temperate, sub-tropical and tropical forest vegetation in the magnificent Kew Gardens and Museums. Within a walk or drive from the College are many interesting woods, already referred to as visited regularly by our students, which serve admirably for the study of sylviculture, and to some extent of forest management. I must not here omit mentioning the extensive Summingdale nurseries for nearly all kinds of trees and shrubs, where every possible procedure for propagating rare and curious species and varieties of woody plants may be studied; nor the Windsor Park nurseries where oaks, elms and other trees are trained to use as large transplants. Opportunities also occur for studying the destruction by forest insects and fungi, for unfortunately the pine, silver fir, and larch cancers and other destructive fungi are common in the neighbouring woods, and *Hylurgus piniperda and Tortrix viridana* regularly attack the pines and oaks in Windsor Forest on a large scale, whilst various species of *Bostrichus* attack dead timber, and many other destructive insects may be found. Our field for the practical study of forestry, however, is not yet by any means exhausted; within twelve hours journey from London, there are in Normandy, I speak advisedly, the finest beech, oak and hornbeam forests in Europe. These forests are managed according to the french system of *Coupes successives de regénération naturelle et des eclaircies*, and these we visited with the first-year students this summer and intend visiting them annually. At Syons, near Rouen, is a State forest of 26,000 acres, where whole woods of nearly pure beech, in 160 years attain an average height of 150 feet, with average diameters for the trees, of 3½ feet, at 4 feet from the ground; here natural regeneration is easily effected within from 10 to 15 years. Further on, near Montagne, is a magnificent forest of oak and beech and hornbeam, where mature woods in 200 years attain a height of 130 feet with an average tree-girth of 8 feet, and which are regenerated naturally in 12 years. The splendid growth of oak and the magnificent natural reproduction in these woods, due to the maritime climate, and the deep loam of the tertiary strata, on which they stand, cannot be surpassed. Within a day's drive from Montagne, we also saw a coppice with standards under conversion to high forest, and on our return journey from Normandy *vid* Calais, we visited, near

Valenciennes, two splendid examples of coppice with standards; one a State Forest of 8,300 acres, subdivided into 15 working circles, and the other a private forest of 3,000 acres, and with rotations of 25 and 12 years respectively for the coppice. At the close of our second year's course at Coopers Hill, our forest students make a working plan of a portion of the Cæsar's Camp forest: during their third year, at the completion of their theoretical training, they are sent on a prolonged tour in the forests of Germany, Switzerland and Austria, under Sir Dietrich Brandis, and prepare a working plan in a selected forest, and this term of practical experience in the Continental forests may, at the discretion of the authorities, be extended to six months.

Now, besides having studied at the Nancy forest school, I have accompanied students from the forest schools of Aschaffenburg, Tubingen, and Carlsruhe on excursions in the German Forests, and I believe that I am right in asserting that no forest school in Europe, can compare with our Coopers Hill training, in the great variety of forests visited, nor in the comprehensiveness of the teaching of forestry, theoretical and practical, as instituted by Dr. Schlich.

Nancy forest officers who were trained between 1867-1886, will remember that the tours made by the French students never extended beyond France, and last year during my six months tour in the forests of Wurttemberg, Baden, Saxony, Bohemia, Bavaria, Alsace and Switzerland, I heard complaints that German forest officers did not see enough of what was going on even in the neighbouring countries of Germany.

Having now explained how matters stand at Coopers Hill, I think that Indian forest officers, after perusing the programme for instruction contained in the last College Calendar, may feel confident that the recruits we are sending them will have seen quite enough of European forests and that they are receiving a training well qualified to fit them for the new ideas involved in Indian forest management, which could not be improved upon if they had received their training at any forest school on the continent.

Whether, after their arrival in India, it would be well, as Mr. Fernandez has suggested, that junior forest students of the Imperial service should spend a cold weather season in the forests of the Dehra Dún Circle, where Indian forest management has presumably progressed more rapidly than elsewhere, I must leave for future discussion. It is, however, certain that here we can only chiefly teach the general principles of forestry and that their practical application to Indian forests must be acquired in India itself, although the professors at Coopers Hill always illustrate their lectures with reference to Indian requirements, and a special set of lectures on Indian sylviculture are given by Dr. Schlich, and another set on Indian forest law and management by Mr. B. H. Baden-Powell.

W. R. FISHER.

Mr. Fisher seems to think that we all see the Coopers Hill Calendar; we wish he would send us some copies, for there is not one even in the Dehra Dún Forest School Library. HON. ED.

An Interesting new Product.

In our October Number, at p. 385, we noticed the specimens of *Saussurea Lappa* sent us from Cashmir by Mr McDonell under the above heading. We have, however, just received from Mr. D. Hooper at Ootacamund, the well-known analytical chemist and quinologist, and part author of the new 'Pharmacographia Indica' a Postcard to tell us that there is a very complete account of the "Kuth' in that work at p.p. 296 to 303 of Vol 2; and that it is quite a mistake to call it 'new.' No doubt we were wrong in using the word 'new'—we used it in the sense that it was an article of forest produce of which we had never heard before and our note shewed sufficiently that we could not have meant that it was 'new' in the sense of 'recently discovered' for we distinctly referred to authors who spoke of it as old. We are sorry we omitted to consult the 'Pharmacographia Indica' before writing, but believe our omission to do so was due to our thinking that it had not got quite so far, and indeed the 'Saussurea Lappa, takes the very last pages of what has been published up to date. Nor did we consult, as we should have done, Baden Powell's 'Punjab Products' for in that work the following are given as the uses of the drug.

"1st. Dried and powdered as the principal ingredient in an 'astringent stimulant ointment, applied to severe ulcerations.

'2nd. Dried and powdered as a hair wash.

'3rd. As a stimulant in Cholera; an infusion is made of 'Cardamoms 1 dr; fresh 'Kut' 3 drs; Water 4 ozs. One ounce 'every half hour. It is doubtless a powerful aromatic stimulant 'and would be serviceable in any spasmodic disease.

'4th. It is universally employed by the Shawl Merchants as 'a protector of Cashmere fabrics from the attacks of moth and 'other vermin.

'5th. The dried root is an agreeable fumigatory, and yields 'excellent pastilles, which burn freely.

'6th. It is exported in enormous quantities to China, where 'it is used as an incense. In every Hong it is found; no mandarin 'will give an audience until the 'Patchak,' incense smokes before 'him; in every floating junk on the Chinese rivers, the only 'house of countless hordes, Budh's image is found, and the smoke 'of the Patchak religiously wends its way heavenwards. As to its 'uses in China, Dr. Porter Smith says that it is used in making 'incense in the South, or to preserve clothes from attacks of moths 'and other insects. It is said to have the power of turning grey 'hair black. Carminative, stimulant, antiseptic, prophylatic, astrin-'gent, sedative and insecticidal properties are referred to this 'remedy. The Chinese apply it with musk, which it resembles in 'odour and properties, to aching teeth."

We need not quote the history of the drug, our readers can refer to Messrs. Dymock, Warden and Hooper's book, but we

think it will be well to quote the *Description* of it as a trade article and the paragraph on *Commerce.*

"*Description.*"—Costus occurs in crooked twisted pieces 'about 3 inches long, and from ½ to 1½ inch in diameter almost 'always split. Externally it is brown, marked by longitudinal 'ridges, and has a rough and somewhat reticulated surface. Its 'substance is compact and brittle, the fractured surface having a 'resinous appearance and dirty white colour. The central portion 'is generally absent, and appears to have been removed by decay 'before the root was collected. The taste is bitter, pungent 'and camphoraceous; the odour resembles that of fresh violets or 'orris roots.

'*Commerce.* The roots are dug in the months of September 'and October, when the plant begins to be torpid; they are 'chopped up into pieces from 2 to 6 inches long, and exported 'without further preparation. The quantity collected is very large, 'amounting, as far as Dr. Falconer could learn, to 10,000 or '12,000 *Khurwars* (load of 192 lbs.) The commodity is laden on 'bullocks, and exported to the Punjab, whence it finds its way to 'Bombay, and a portion to Calcutta through India. In Dr. 'Falconer's time, the cost of collection and transport was about 'half a crown per cwt. Cleghorn states that it is also exported 'from Pangi on the Upper Chenab to the plains. The loads of it 'when passing scent the air to some distance. Davies' "Trade 'Report" gives 29 maunds as exported to Afghanistan *via* the 'Bolan. Royle mentions that in one year (1837-38) 6,697 'maunds of this root, valued at Rs. 99,000, were exported from 'Calcutta to China, and in 1867-68 nearly Rs. 10,000 maunds. 'In Cashmere, the Maharaja is said to take it over from the 'collectors at half the price at which it sells again. In 1864, his 'income from this source was put down, on good authority, (accord- 'ing to Dr. Stewart) at Rs. 300,000 Chilki, equal to nearly 'Rs. 1,90,000 but this, he adds, is scarcely credible*. Kut is 'imported into Leh in small quantities from Cashmere for exporta- 'tion to Lhassa, where it is called, as well as by the Bhotes, '*Rusta*, and is used for incense. In 1871, 33 maunds were 'imported into Leh from Cashmere, valued at Rs. 692. According 'to Dr. Falconer, at the time he wrote, the cost of collection and 'transport to a depôt in Cashmere was 2s. 4d. per cwt: on 'entering India its value was enhanced to from 16s. 9d. to '23s. 9d. per cwt, whilst the commercial value at Canton was '47s. 5d. per cwt. From the Consular reports, it appears that 'in the year 1875 the imports of Costus into two Chinese ports 'only were: for Hankow 1,270 piculs, valued at £5,224-6s 3d.; 'and for Cheefoo 277 piculs, valued at £1,197; so that it is clearly 'no insignificant article of Chinese Commerce. (Cooke, in 'Phar. Jour. 21st July, 1877.) The value of Costus in Bombay 'averages Rs. 10 per maund of 37½ lbs.

*In the last Official Reports, the export of Chob-i-koot to the Punjab are valued at Rs. 16,000 only, but under the head of drugs, &c, there are exports valued at Rs. 1,00,000, part of which may possibly be Costus.

Leaf-fungus on Ehretia serrata.

In our August 1891 Number, p. 303, we referred to the lamented death of Dr. A. Barclay, one of the few Indian students on the very important subject of the fungoid diseases of forest trees. Scarcely a month before his death, a paper on the subject of Uredineæ from the North-West Himalaya was read before the Asiatic Society of Bengal and in it we find an account of '*Uredo Ehretiæ*' a leaf-fungus which was found growing in conspicuous orange patches on the leaves of *Ehretia serrata*, when the Forest School students were in camp at Thadyar on the banks of the Tons in May, 1891. The following were Dr. Barclay's remarks.

'UREDO EHRETIÆ NOV. SP.

'ON EHRETIA SERRATA, ROXB.

"This fungus was collected by Mr. J. S. Gamble on the 'banks of the Tons river near Chakrata. The leaves are attacked 'by a Uredinous fungus of somewhat uncertain nature. Some 'leaves had circular spots varying in diameter from 1 to 8 m.m. 'whilst others had large hypertrophies of the petiole as it enters 'the lamina, and these were uniformly covered with bright orange 'red pulverulent spores. Transverse sections through the fungus 'and leaf show that the spores are not borne separately on stalks, 'but from a cup-like depression like the pit of an aecidium without 'any peridium. There were also numerous superficial spermo-'gonia. The spores are orange red, oval or pear-shaped, very 'spiny, decidedly thickened at the free end (reminding one of the 'æcidio-and uredospores of *Puccinia Prainiana*). They become 'detached without any portion of the stalk adhering. The spores 'are given off from both surfaces of the leaves. By applying nitric 'acid I saw that each spore had two germ pores.

'This is the first member of the Borragineæ which I have seen 'attacked in India by a Uredine. As *Puccinia Rubigo-vera*, or 'some variety or allied species, is undoubtedly the most prevalent 'and destructive rust on wheat, barley, and oats in India, I had 'long looked for some associated form on a Boragineous host, and 'this not only by personal search, but also by correspondence. I am 'afraid, however, that this particular Uredine cannot be the associ-'ated form I have been looking for although it is just possible 'that it is. For although the spores are given off like uredospores, 'the cup-shaped depressions in which they are formed, the 'presence of spermogonia, and the hypertrophy of the hosts tissue 'all render it possible that we have here an anomalous Aecidium. 'This question will have to be tested by experiment."

Among other important tree-fungi described in the same paper were *Melampsora ciliata* a light yellow Uredo found at

Simla on *Populus ciliata*, *Melampsora æcidioides* an orange-red fungus found by Mr. Lace at 8,500 feet on *Populus alba*; *Uredo Colebrookiæ* found by Dr. Watt, near Suni on *Colebrookia oppositifolia*, also of an orange red colour; and *Æcidium Cunning hanianum* found at Mahasu and Narkanda by Dr. Barclay, and supposed by him to be identical with, and alternate to, the Cypress fungus, *Gymnosporangium Cunninghamianum*.

II. CORRESPONDENCE.

A Hand Seed-drill.

DEAR SIR,

I herewith send a rough tracing from Messrs. Walsh Lovett's Catalogue. The instrument shown in the diagram is called a "hand seed-drill."

It is 'suitable for filling up blank places in fields, and for all kinds of garden drilling. It can be adjusted for sowing almost all kinds of seeds. The moment it is lifted off the ground, the seed ceases to fall through. A boy can work it as fast as he can walk. Prices one row 10s. 6d. Two rows £1-2-6.'

It occurred to me that this machine, costing say from Rs. 7 to Rs. 15, might be very useful in "broad-cast" sowing; as it gives apparently scarcely any more trouble than that method, whilst at the same time it makes its furrow for the seeds.

I therefore forward this to you, in case it may be of use to any of your readers.

A. W. LUSHINGTON.

III. OFFICIAL PAPERS & INTELLIGENCE.

Bengal Arboriculture.

In reviewing the work of the land Records and Agriculture Department in Bengal for 1890-91, the Lieutenant-Governor writes as follows :—

"*Arboriculture.*—With the exception of the planting of fruit 'trees along the road-sides, which must be regarded rather as an 'administrative measure adopted for shade purposes and the pre-'servation of road alignments, than as an agricultural experi-'ment, the arboricutural efforts of the department do not seem to 'have been extensive or productive of much practical good. The 'Lieutenant-Governor does not, for instance, see much use in 'planting date-palms where nature has not planted them, or in 'pushing artifically the cultivation of such trees as the *Euculyptus*, '*Divi-Divi*, or the *rain-tree*."

Though we are not quite sure that we agree with him entirely as regards the *date*, the edible variety of which, though unsuited to avenues, we consider to be well worth some pains and expense to bring into general cultivation as a valuable food crop; or the *Divi-Divi*, which, though useless as an avenue tree, gives one of the best tans known and is easily grown, very productive, and capable of paying very well whenever the supply of Valloria Oak in the European Market falls short, as it did, we believe, during the Russo-Turkish war; we do argue very strongly as regards the Eucalypti and the rain-tree. The 'rain-tree' (*Pithecolobium Saman*) is an exceedingly quick grower, but we believe that it absolutely requires good soil and a moist climate and for such conditions we have hundreds of valuable indigenous trees with splendid timbers and other produce infinitely more useful than the rain-tree, whose wood is hardly even a good fuel. As a nurse to other trees, the rain-tree has been very useful as in the Calcutta Gardens, but as an avenue tree scarcely a worse selection could be made. Some of the Eucalypti again have been grown successfully into trees in various parts of the plains of India, where each individual has been carefully treated and carefully watered and coddled, but on the whole, the success of Eucalyptus growing has been very doubtful. In the Nilgiris Eucalypti have, of course, been extremely useful and have practically acclimatized themselves, but their value is chiefly due to their extremely quick growth compared to that of the trees of the indigenous 'sholas'; and where it is possible to plant Teak, or Blackwood, or Padouk, or Mahogany, or Shisham or any other of our good timber trees why should we waste money on the Eucalypti whose timbers are comparatively poor, and which have abundantly shewn that in the Indian plains, they possess no

species fit to emulate those acclimatized on the S. India mountains.

If we could take the seeds of the Eucalypti or of the Rain-tree and scatter them broadcast on our poor forest lands like those of Ajmere, of Amraoti, of Bellary etc, and if those seeds would then germinate easily and abundantly and quickly restore the forest, then we should be the first to advise their extensive use; but as they are no use in such places, we shall do better to take Sir Charles Elliott's advise and give them up and stick to our own more valuable and prettier indigenous friends.

IV. REVIEWS.

Government Horticultural Gardens, Lucknow, for 1891.

To judge by the Report before us, excellent work continues to be done in the Lucknow Gardens and not only do the gardens seem to be most useful, but the Report for this year is full of most interesting information on the subject of the growth of fruit and other trees; and so we are glad to notice commendation bestowed on Mr. Ridley by the Director of Agriculture.

The chapter on *fruit culture* records that 1889 was a good year for mangoes, an average year for peaches, lichis, pineapples and jack fruit and a poor one for oranges. Loquats, in the spring of 1890, at which time they are kind enough to appear when other fruits are not available, were a light crop, while here in Dehra Dún they produced very well. The Gardens are continually introducing new fruits. This year the American dewberry *(Rubus trivialis)* is being tried, also the Natal plum *(Carissa grandiflora)* which we are sorry to see does not ripen, for those who have once tasted it in its South African home must regret that it has not yet been acclimatized in India.

In respect to *Arboriculture* much is being done. Large numbers of Forest tree seedlings are regularly raised and distributed, the demand being, apparently, considerable. It is interesting to note the demand for Eucalyptus leaves for the removal of incrustations in boilers and the sale of 18¾ maunds of dry bark of the *Broussonetia papprifera* to the local paper mills at 8 as. per maund. A great many palms are found to grow successfully, among them such fine and interesting kinds as the *Oreodoxa regia*, two *Coryphas*, *Hyophorbe Verschaffeldtii*, *Siaforthia Elegans* and *Wallichia disticha*.

We are, however, sorry to note that the edible date is not succeeding so well as it might be expected to do, for deaths have been many. It is pointed out that greater success is obtainable in trenched land than in ground which has not been so treated.

The Agri-Horticultural Gardens, Lahore, 1890-91.

Even the *Agri-Horticultural Gardens at Lahore* must have their annual report and review on it! For the year ending 31st March, 1891, the revenue was Rs. 15,263 against an expenditure of Rs. 23,630. More than half of the latter was incurred on Establishment, and two-thirds of the revenue was derived from the sale of garden produce. We note that mangoes do not thrive well in the Lahore soil and climate, and that only two imported date trees are alive; some 328 seedlings from Tunisian and Persian Gulf dates were distributed to districts.

The following remarks about the orange crop are interesting:—

"The orange crop was very poor. The dull and rainy 'autumn specially affected the Malta variety. Their flavour was 'very deficient, and scarcely any of the fruits were blood coloured. 'Among those received from Mr. Halsey, one tree named '"Calabra" fruited for the first time this year. The fruit was 'much superior to any of the other Malta oranges, it having a 'decided flavour of strawberry. The tree bore only 3 oranges, but 'this spring it is bearing a very fair crop."

An orange with the flavour of a strawberry must be a curiosity, and it is just possible it might lose this flavour outside of Lahore.

The Mahogany is apparently attacked by the grub of a moth in a similar way to the Toon tree; is it the same insect?

"The one Mahogany tree mentioned in previous reports, 'though in a healthy condition, is making but slow growth owing 'to the tips of the young shoots being continually attacked by a 'small grub which eats down into the centre of the young growth 'which keeps the tree in a stunted condition."

A. S.

The Nagpore Experimental Farm 1890-91.

The '*Report on the Nagpur Experimental Farm in the Central Provinces for 1890-91*' shews that excellent work is being done in experimental Agriculture. The useful map of the Farm which is published will be a great help to visitors inspecting it, while the description of the experiments leaves no doubt in one's mind that Mr. Fuller the Commissioner of Agriculture is

doing, what might be more generally done, really good practical work instead of sitting in office and talking about it while fulminating edicts to Collectors. And he evidently is well served by his Superintendant Mr. Mahaluxmivála. The experiments conducted include (1) tillage; (2) embankments; (3) mixture of crops; (4) rotation; (5) manures with trials of (6) varieties of crops; (7) thick and thin sowing; (8) selected seed; (9) saltpetre top dressing; (10) pickled seed. We must refer our readers to the Report for the results of these, as our mention that 'embankment' for the growth of wheat added Rs. 10 per acre to the produce, with manure, and 4-8 without manure; and that the use of green-manure of the common *Cassia auriculata* (Tangedu or avaram of S. India) added 222 lbs of grain per acre to the produce. We will conclude by quoting Mr. Fuller's para 14 on his Agriculture class.

"The condition of the Agricultural class is not quite so 'hopeful as it appeared to be last year. The students who 'passed out qualified last March shewed on their examination 'that the course of instruction is sound and that they had profited 'by it. But this year's entries are fewer than before, and there 'have been signs in this falling off and in the behaviour of 'the students, of a distrust on the part of the educated classes of 'the policy of Government in offering young men inducements 'to undergo a training in agriculture, instead of pursuing their 'education in Arts"—for the 'distrust' is truly characteristic of the country and needs no comment. Agriculture does not pay as a stepping stone to employment: we shall be glad when the Indian Government begins to insist on some scientific and technical knowledge. What would be more useful to a sucking Tahsildar than a practical acquaintance with the elements of agriculture and the various sciences which come into play in its study and practice.

Arboriculture in the Hyderabad Assigned District 1890-91.

The '*Report on Arboriculture in the Hyderabad Assigned Districts, for* 1890-91' has not much which we can note. But we regret that the Commissioner has taken no notice of Mr. Dickinson's complaints regarding the felling of fine trees included in village numbers and the non-reservation of space along roads for the growth of trees. In connection with this Report we may, some of us, congratulate ourselves that Conservators of Forests are not everywhere expected to supervise District arboricultural operations; life would be too short for that.

The Departments of Land Records and Arigculture in Bengal and Assam, 1890-91.

The '*Annual Report of the Department of Land Records and Agriculture in Bengal, for* 1890-91' contains much of interest to one who knows the Lower Provinces, but little which we can note as of interest to Forest Officers generally. We are glad to see that good maps are being made for the Forest Districts of Orissa, Julpigoree and Chittagong and the capital Index maps of those countries are interesting to the lover of maps. Date palms do not seem to be a success in Behar and Chota Nagpore; may we suggest that a comparison with Egypt would point to the probability of greater success in the upper Districts of the Delta where the sub-soil is likely to be moist, than in Hazaribagh and Palamow, where the rock is so near the surface. The rain-tree is a success everywhere; of course it is! and as it does not even help to reclaim *usar* lands as it was hoped it would, we do not see what use it is to waste money on it, unless some one requires a fuel plantation tree. Eucalyptus (sic) thrives in Hazaribagh, but which kind? As Bentham and von Mueller have described 135 species of the genus, it would be interesting to know the names of those which have been successful.

The similar '*Report for Assam* 1890-91' also contains a useful small map of the province, but devotes two and a half pages out of eleven to the tours of the Director and his Assistant; and we note that the Government is not even then satisfied, for special explanation is demanded in future years when any Kánungo spends less than 200 days in Camp! The *eri* silk and the possibility of its introduction from Assam to other Provinces, most rightly demands attention. Castor oil will grow well almost anywhere and we believe that in spite of the difficulty in reeling it off, *eri* silk has a great future in Districts where the growth of Mulberry is impossible. In reference to the Circular of the Government of India about fuel and fodder reserves near lines of Railway, we note the indignant reply of the Commissioner of the Assam Valley Districts 'we suffer from jungle'!

Potato Culture.

We have been favoured with a small manual on Potato Culture by Mr. F. W. Seers, Superintendent of the Ramghur Tea, fruit and potato gardens, Kumaon.* The author proposes to

*Potato Culture: a Manual for Indian Cultivators by F. W. Seers, (W. H. Targett, "Asian" Office, 4 Waterloo St., Calcutta). Price Rs. 1 per copy.

place before the public a simple code of plain practical instructions, such as can be easily explained to the ordinary Indian *Malee*.

We are first of all shewn that it is quite possible to grow continuous crops of potato on the same plot of ground, provided that care be taken to return to the soil in the shape of suitable manure what has been taken out of it; and if the ordinary cultivator does not do this, but on the contrary changes his plot every two or three years, it is because he does not repay what he has borrowed; in other word he neglects to manure.

The second chapter deals with soils and their preparation, and the characteristics of clays, marls and loams are briefly dealt with. Then we have manures and their application, and it is noteworthy that coal soots and wood ash mixed are recommended. But it may well be asked, where is the ordinary Indian gardener, or his master too, for that matter, to procure coal soot from? It is by no means a common article in India. However, good farmyard manure well rotted down in covered pits is also recommended and this is certainly more easily obtainable; it has in addition the useful qualification of increasing the gross produce per acre about four times; if the standard of unmanured ordinary land be taken at 110 maunds, the yield of the acre prepared with farm yard manure will rise to 450 maunds. For the method of application the reader must be referred to the little manual itself.

Under "Seed and planting" we note that the system of cutting up the potato into eyes is condemned, and that the best course is to plant uniformly even, good, medium-sized, whole potatoes. Careful and detailed instructions are given as to the actual sowing or planting out of the potatoes; the subsequent weeding and earthing up and the selection of seed are all practically described; and we rise from a perusal of the 27 pages feeling that we understand thoroughly *how* to plant potatoes successfully. But we are not told *when* to plant, there is not a word from beginning to end to tell us in what month we should lay down the seed, or when we should take the potato up. We trust that Mr. Seers in his next edition will supply this small omission, and inform us what is the best month for planting in the hills and plains respectively, meanwhile we must be guided by the custom of the locality, and we can cordially recommend this little manual to our readers for all purposes of cultivation. We ought indeed to be thankful to any one who endeavours to improve both in quality and in quantity the outturn of this most important tuber. The price of the manual, one rupee, places it within the reach of all.

V.—EXTRACTS, NOTES AND QUERIES.

Diseases of Conifers.

The following extracts from a leading Article in the Gardener's Chronicle on the recent Conifer Conference at Chiswick may perhaps be of interest to our readers.

'Professor MARSHALL WARD, as the representative of our first 'Forest School, gave an admirable address on the diseases to which 'Conifers are subject. This address was a model of perspicuity, 'begotten of full knowledge of the subject. Dealing really with a 'very technical and complicated subject, Professor WARD managed 'to put before his hearers, in the clearest manner, an admirable 'survey of the subject. How so learned a scientist managed to give 'his hearers so clear a summary, with so little use of technical 'terms, was a matter of surprise. The word "mycelium" in place 'of spawn was almost the only technical term we noticed, as, with 'great skill, Mr. WARD managed to convey a lucid notion of the 'extremely interesting phenomena of "heteroicism," which are as 'important to the cultivator as to the man of science, but which, 'owing to the technicalities ordinarily made use of, make the 'subject more or less of a sealed book to the very persons most 'specially interested from a practical point of view. Professor 'WARD alluded first of all to the diseases consequent upon a want 'of balance and proportion between root-action and leaf-action, and 'to the climatal and other causes which bring about such a want 'of proportion.

'Passing then to the consideration of diseases due to the 'action of fungi, Professor WARD alluded first to those of the 'better-known fungi, commonly classed as Toadstools and Mush-'rooms, which attack trees; then to the rust fungi, which affect 'the leaves in the first instance, and then to the ascomycetous 'mould. Special attention was given to the "wound fungi," and 'to those which gain an entrance through cracks in the bark, or 'injuries inflicted by frost, insects, animals, and man. He showed 'how, out of the countless millions of spores produced, there was 'ample opportunity for the introduction of the germs of the 'fungi, which, germinating under appropriate conditions, penetrate 'the wood, absorb the nourishment contained in it, and interfere 'with the healthy action of the tree.

'The rust fungi are particularly remarkable in that they pass 'one part of their life on one plant, and work out another portion 'of their life-history on some other plant of a totally different 'nature; the fungus itself in the two conditions being so utterly 'different as to have led to the application of different names, and 'to the classification of the forms in different groups. Thus a

'particular fungus growing on the common Groundsel or one on a 'Vaccinium has a totally different aspect when living on a Silver 'Fir. Practical men will remember with complacency that this 'relation between apparently different organisms was long ago 'found out by the farmers, who branded the Barberry bushes as 'enemies to the Wheat. They were ridiculed at the time for 'this, but experience has shown that they were right as to their 'facts, although widely in error as to their interpretation of them. 'It is not the Barberry bushes that do the mischief, but a fungus 'which grows upon them. But who, without the minute study 'that the scientists have made, could believe that the rust of 'Wheat and the cluster cups of the Barberry have any real con-'nection, or be indeed specifically identical, or that a fungus on 'the Juniper could affect the Hawthorn, or one on the Groundsel 'prove prejudicial to the Firs, producing a growth of entirely 'different character according to the plant on which it grows? 'And yet, thanks to DE BARY and others, in Germany, and to 'PLOWRIGHT, particularly, in this country, the fact has been prov-'ed to demonstration by the process of inoculating the tree with 'spores of the fungus from the other plant and *vice versâ*. For 'tunately, vegetable physiologists are not hampered by the mis-'guided anti-vivisectionists and so the truth can be more readily 'arrived at. Considering, on the one hand, the injuries to which 'plants are subject from insects, squirrels, frost, wind, friction of 'branches, or mischievous boys; and considering, on the other 'hand, the enormously great production of fungus spores, the 'wonder is, not that trees are attacked, but that disease is not 'far more prevalent than it is.

'With reference to the Larch, Professor WARD considered 'that the prevalence of the disease in some districts of this coun-'try, as contrasted with its relative infrequency in its native Alps, 'is really due in great measure to the fact that we, in this coun-'try, all unwittingly, put the Larch under conditions more favour-'able to the growth of the fungus that to that of the tree. It 'was disquieting, too, to learn that the Douglas Fir, to which we 'are looking as one substitute for the Larch in certain situations, 'has its enemy in the shape of a mould or Botrytis, which may 'be as fatal as the Peziza on the Larch."

Saltness of Cocoanut Milk in the Sunderbuns.

Have any of our readers who have travelled in the Sunderbuns, found that the Milk of Cocoanut trees in villages in and around them is salt?

In *Nature* for November 5th, 1891, Mr. W. B. Hemsley, reviewing two German works on coast vegetation, says, on the authority of Mr. C. B. Clarke, that in such localities the 'Milk' is so salt as to be undrinkable.'

Grass Farming at Allahabad.

"About the most difficult administrative military problem 'the Government of India has had to solve of late years, has 'been the grass supply of the army. Strategic reasons for the 'distribution of troops have had to be set aside in consequence of 'the dearth of fodder in certain cantonments." So wrote, in 1885, the late Major-General Sir Herbert Macpherson to whose initiation is due the establishment of grass farms in Indian cantonments. The scheme initiated by him in 1882 has been attended with marked success in those localities where it has been carried out on the lines laid down by him ; in other places it has resulted in more or less failure, the reasons for which will be detailed later on.

There cannot be any doubt that the supply of grass and fodder in sufficient quantity and at a reasonable cost for the army in India, is a question of immense importance to the military authorities. The only wonder is that the subject has not engaged the serious attention of the responsible authorities more systematically than appears to have been the case. Efforts have, we know, been made, from time to time, to cope with the difficulty ; but these would appear to have been of a more or less spasmodic character, without any well-recognised or definite plan. The requirements of the army have been met by the old-fashioned contractor system, which has invariably resulted in filling the contractor's pocket to an inordinate extent, without any corresponding advantage appreciable to the Government. But everything has its day, and let us hope that the contractor is an institution of the past, so far at least as the supply of grass and fodder is concerned ; and if every large cantonment were worked on the system adopted at Allahabad, Sir Herbert Macpherson's idea would ere this have been fully realised.

Reading over a memorandum written by Sir H. Macpherson in 1885, "On the experimental cultivation of grass for forage on cantonment land at Allahabad," it occurred to me to pay a visit to the grass farm, with a view to ascertain what measure of success had attended the undertaking so strongly advocated by that officer, and I was considerably astonished at the progress made and results obtained, of which the outside public know very little. It may, therefore, be of interest to record here what has been done, what is now being done, and what may be expected in the future, with such suggestions as have occurred to me for the consideration of the responsible authorities.

Under the old system, grass-cutters belonging to Native Cavalry and European Artillery stationed at Allahabad, used to be sent out to cut grass wherever they could find it. These grass-cutters trespassed on lands belonging to cultivators, and carried away grass without payment. Very often this was resented by

the villagers, who forcibly objected to being defrauded of their property, and the feuds were the source of endless troubles to the civil authorities. In referring to this phase of the grass-cutter system the late Sir H. Macpherson wrote ; "They are virtually 'stealing what is the property of the zemindar or ryot ; and even 'in those cases where the ryots have no distinct claim, their 'com-'mon' right is interfered with, as the village cattle have probably 'fed on the lands from time immemorial." This has all been changed now so far as Allahabad is concerned, for while the ryot or zemindar is left in peaceful enjoyment of his 'common' and other rights, the Government has removed one fruitful cause of irritation " between a most deserving class of the native population and the servants of Government" (to quote Sir H. Macpherson), with considerable advantage to the State exchequer, as will be shown presently.

The Allahabad grass farm was started under some difficulties, owing to some local opposition (which was expected) and with small beginnings ; but this was soon overcome, and the working of the first three years showed a clear profit to Government of Rs, 25,000. It was calculated that were the grass scheme to be introduced into every Indian cantonment, and worked as successfully, it would result not only in a supply of fodder for Government cattle being a certainty all the year round, but effect a saving of twenty lakhs of rupees in the military expenditure in five years. From the year 1882-83 to 1889-90 the savings to Government at Allahabad alone, amounted to Rs. 1,13,000, after deducting the cost of Government transport used. There are in all 23 cantonments, and were each of these to record a saving of even one lakh, the State would be now the richer by 23 lakhs of rupees; so that the estimated saving of 20 lakhs in the military expenditure, calculated by Sir H. Macpherson, was not by any means an extravagant one.

The success of the Allahabad grass farm has been maintained, for during the year 1890-91 its operations were extended. The Alfred Park was rented for Rs. 1,800 ; 500 acres at Bargarh (on the Jubbulpore line) for Rs. 200, and the two encamping grounds at Mufti-ki-Purwa and Jhusi, for Rs. 210 ; thus increasing the annual rent paid by the farm from Rs. 14,789 to Rs. 17,000 ; and the total area farmed was raised to nearly 3,000 acres, which yielded no less than 3,25,821 maunds of green grass, which actually cost Rs. 36,881, including rent and all miscellaneous charges, the actual value of which was Rs. 85,470, or a clear gain to Government of Rs. 48,588, as compared with Rs. 32,593 in the preceding year. Of the total harvest, 1,53,102 maunds were issued to Government cattle as green grass; nearly 24,000 maunds in the shape of silage, and 41,749 maunds as hay ; leaving a surplus on hand at the end of the year of 10,800 maunds as silage and 10,000 maunds as hay. These figures speak for themselves, but these remarkable results were obtained by the application

of sound commercial principles to an undertaking which, had it been left to the tender mercies of uninformed supervision, would certainly have ended in disastrous failure, as has been the case in some of the other cantonments.

The first principle of cultivation is to manure the land and plough it. In Europe and America laying down large tracts in pasture is a recognised system; but it has to be done methodically. Great tracts of what were once considered waste lands have been turned into smiling meadows. Those who remember Allahabad eight or ten years ago have probably not forgotten the miles of arid, glaring, dust-laden tracts which formed the chief feature of the landscape. These have, by judicious draining, bunding, ploughing and manuring been turned into smiling meadows, with a luxuriant growth of vegetation. As to the sanitary effects of vegetation, it has been argued by some that it is one source of sickness. But this is refuted by one the greatest authorities on hygiene, who says: " Herbage is always healthy. In the ' tropics it cools the ground by obstructing the sun's rays and by ' aiding evaporation, and nothing is more desirable than to cover, ' if is be possible, the hot sandy plains of the tropics with close-cut ' grass."

It was also argued some years back that the grass farm would interfere with private enterprise. Why this should be so is not clear, since under the old system it was the grass-cutters who brought in the forage under circumstances already detailed above. The only private enterprise interfered with is the contractor who, used to lease the cantonment lands at a nominal figure. Moreover, I was surprised to learn that the farm affords employment to some thousands of poor people annually, at a time when work is scarce, and is thus a sort of famine relief during seasons of drought and scarcity. The people of the villages surrounding Allahabad look upon the farm as a source of livelihood.

This year I learn that the farm has arranged to supply fodder to mounted Corps on the line of march, by taking up all encamping grounds in the Allahabad district. So far this arrangement has worked very successfully; but some time is yet necessary to prove the advantages of this new departure This farm supplies fodder to the following:—The whole of the mounted Corps at Allahabad, comprising one battery of artillery and one regiment of native cavalry; the whole of the Government transport and slaughter cattle, the dairy cows and its own bullocks and horses. In addition to the above it feeds about 110 horses belonging to officers, as Rs. 4 per horse per mensem. So that the farm has actually doubled its capabilities during the last two years—a most gratifying result, which has been brought about by manuring and improving the land, under capable supervision.

I now come to what I consider a most interesting feature of the grass farm, *viz.*, the introduction this year of labour-saving

machinery. I had always believed that labour being so very cheap and pentiful in this country, machinery such as is used in England for mowing and threshing would prove an utter failure. But this belief has received a shock. In April last some moving and harvesting machines, also field rakes, were imported. These have been at work since, the motive power being Commissariat bullocks. The natives have 'tumbled' to the new idea with wonderful alacrity, and so successful have these machines proved at Allahabad, that already their use has resulted in a saving of something like Rs. 8,000, which in itself more than covers the initial outlay on the machines. It is a treat to see the mowers and threshers at work: they demonstrate in a striking manner the value of labour-saving machinery on cantonment grass farms, when properly managed. When the grass is cut and dried it is delivered over to another machine, which turns it out in its final stage, in closely pressed bales of a convenient size for handing, and neatly bound about with stout wire.

The points which suggest themselves for earnest consideration appear to me to be as follows:—(*a*) the necessity for introducing the Government grass farm system in every cantonment in India. Its success has been amply demonstrated at Allahabad; and the only apparent reason for its non-adoption more generally, seems to be that it has not proved a paying venture at Cawnpore, Rawalpindi, Meerut, and probably some other stations. But this is obviously due to the system not being worked on a properly organised plan. At Allahabad the Generals commanding have taken the most lively interest in the matter; but they could not have carried out the idea with any degree of success were it not for the fact that they have had a most capable man in charge of the farm in the person of Conductor D. J. Meagher, who, in addition to the practical knowledge he possesses of the work to be done, takes the keenest interest in all that pertains to the farm. He moreover speaks the language, and by his tact in dealing with the natives, gets them to share his interest in the farm work. (*b*) The present committee system of working cantonment grass farms does not appear to be the best. The whole of the cantonment grass farms should be worked by a separate department, having well-defined rules and regulations applicable to all alike, except where it may be necessary to make any slight modifications to suit local requirements and conditions. It seems to me that, as the supply of fodder is part of the Commissariat Department work, the best way would be to place the entire management of cantonment grass farms under that department, which should establish what I may call a Forage Branch, to be under the control of one officer, who should be authorised to conduct all operations under this head. He would select and appoint suitable men as farm overseers, chosen from amongst the non-commissioned officers of the army, who may have some previous experience of farm work. (*c*) The experiment

at Allahabad having proved a success in every way, it should be taken as a guide for all other cantonments. If a grass farm can be worked with so much profit to Government in one station, there is no obvious reason why it should prove otherwise in others. But as I have said above, the management must be in capable hands, otherwise there is no hope of obtaining satisfactory results.—*Pioneer.*

A Cannibal Plant.

Some years ago, a striking story was published in France, describing a wonderful flesh-eating plant discovered by a great botanist. If we remember rightly, the story recounted how a certain collector discovered a plant of the fly-trap species of so gigantic a size that it could consume huge masses of raw meat. Just as the fly-catching plant snaps up a fly and draws nutriment from the fly's dead body, so this one fed itself on the legs of mutton and sirloins of beef which were thrown into its ravening maw. The botanist in the story, for some reason, possibly fear of having his plant destroyed as dangerous to public safety, keeps the existence of the plant a secret, and preserves it in a locked-up conservatory. His wife, however, who is made miserable by his absorption of mind—he thinks of nothing but how to feed and improve his wonderful and fascinating plant—determines to follow him. This she does, accompanied by an old school-friend of the husband. When the pair reach the inner conservatory, they see, to their horror, the infatuated botanist tossing bleeding joints of raw meat into the huge jaws of a giant fly-trap. They are at first petrified with horror. At last, however, the wife throws herself into the arms of her husband, and implores him to give up dwelling upon the horrible carnivorous monstrosity which he has discovered and reared. Unfortunately, however, the wife in appealing to her husband goes too close to the plant. Its huge tentacles surround her and then proceed to drag her in, and the two stupefied men see the plant begin to devour its victim. Fortunately, however, the friend catches sight of an axe lying near, and seizing this he strikes at the roots of the plant. A few frenzied blows do the necessary work, and the flesh-eating plant tumbles to the ground and releases from its clutches the terrified woman. The botanist, however, cannot survive his most cherished discovery, and with the exclamation. "You have killed my plant!" he falls back dead.

The story is good enough as a story, but if we are to believe an article said, in the *Review of Reviews*, to be taken from *Lucifer*—we say "said" advisedly, because we have looked in the October *Lucifer* and can find no such article, and therefore presume there must be some mistake—it is only another instance of fiction being prophetic, and anticipating scientific discovery.

According to the article quoted by Mr. Stead, there has been discovered in Nicaragua a flesh-eating, or rather, man-eating plant, which for horror is quite the equal of the novelist's imagination. This plant is found, it is asserted, in Nicaragua, and is called by the natives "the devil's snare." In form it is a kind of vegetable octopus, or devil-fish, and is able to drain the blood of any living thing which comes within its clutches. We give the story with all reserve, but it must be admitted to be circumstantial enough in all its details to be possible. It appears that a Mr. Dunstan, a naturalist, has lately returned from Central America, where he spent two years in the study of the plants and animals of those regions. In one of the swamps which surround the great Nicaragua Lake, he discovered the singular growth of which we are writing. "He was engaged in hunting for botanical and entomological specimens, when he heard his dog cry out, as if in agony, from a distance. Running to the spot whence the animal's cries came, Mr. Dunstan found him enveloped in a perfect network of what seemed to be a fine, rope-like tissue of roots and fibres. The plant or vine seemed composed entirely of bare, interlacing stems resembling, more than anything else, the branches of the weeping-willow denuded of its foliage, but of a dark, nearly black hue, and covered with a thick, viscid gum that exuded from the pores." Drawing his knife, Mr. Dunstan attempted to cut the poor beast free; but it was with the very greatest difficulty that he managed to sever the fleshy muscular fibres of the plant. When the dog was extricated from the coils of the plant, Mr. Dunstan saw, to his horror and amazement, that the dog's body was bloodstained, "while the skin appeared to have been actually sucked or puckered in spots," and the animal staggered as if from exhaustion. "In cutting the vine, the twigs curled like living, sinuous fingers about Mr. Dunstan's hand and it required no slight force to free the member from its clinging grasp, which left the flesh red and blistered. The gum exuding from the vine was of a greyish, dark tinge remarkably adhesive and of a disagreeable animal odour, powerful and nauseating to inhale." The natives, we are told, showed the greatest horror of the plant, which, as we have noted above, they called the "devil's snare," and they recounted to the naturalist many stories of its death-dealing powers. Mr. Dunstan, we are told, was able to discover very little about the nature of the plant, owing to the difficulty of handling it, for its grasp can only be shaken off with the loss of skin, and even of flesh. As near as he could ascertain, however, the power of suction is contained "in a number of infinitesimal mouths or little suckers, which, ordinarily closed, open for the reception of food." "If the substance is animal, the blood is drawn off and the carcass or refuse then dropped. A lump of raw meat being thrown it, in the short space of five minutes the blood will be thoroughly drunk off and the mass thrown aside. Its voracity is almost beyond belief."

The story is unquestionably a very curious one, and we may rely upon it, that if the plant really does exist, we shall soon have a specimen at Kew. The digging of the Nicaragua Canal will bring plenty of Americans and Englishmen into the very country where the "Vampire Vine" is said to exist, and the question whether the whole thing is or is not a hoax may very soon be tested. This fact makes, we readily admit, very much in favour of the truth of the story. Since the shores of the Nicaragua Lake are soon to be explored, it would have been far safer for a botanical practical joker to have "seated" his plant in that natural home of unverifiable strange stories, the Upper Valley of the Amazon. The neighbourhood inhabited by that Amazonian tribe who, by the use of some secret process, can reduce a human corpse to a tenth of its original size, and so produce a perfectly proportioned miniature mummy of the dead man, would have been a good locality in which to "place" the tale of the cannibal plant. Again, Nicaragua is within the Tropics, and plant-life there is therefore specially gross and vigorous. Besides, there is no inherent impossibility in the idea of a flesh-eating plant. It is merely a question as to whether evolution has or has not happened to develop the fly-eating plant on a sufficiently large enough scale to do what is related of the Vampire Vine. No one who has seen the ugly snap which that tiny vegetable crab, Venus's fly-trap, gives when the hairs inside its mouth are tickled by the human finger in the way that a fly would tickle them by walking, can doubt for a moment that the development of a plant capable of eating or sucking the blood of man, is only a matter of degree. Even in England, there are plants which act on on a small scale exactly the part asserted to be played by the Vampire Vine,—for example, *Lathræa squamaria*, the toothwort, "a pale chlorophyll-less parasite found in British woods." The account of the plant given by Mr. G. A. Thomson in "Chambers' Encyclopædia," is as follows:—"Excepting the flower-stalk, the stalk is virtually underground; it bears suctorial roots and tooth-like leaves. The latter are hollow, and are entered through a narrow aperture by many kinds of small animals. These seem to be entangled in protoplasmic exudations within the leaf-cavity, find exit impossible, die, decompose, and are absorbed." Even more remarkable is Mr. Thomson's account of the carnivorous proclivities of the butterwort. This plant secretes "a copious viscid acid secretion to entrap its victims." "This serves as 'insect-lime;' but, besides retaining the unwary midges, it finally digests them. Drops of rain may fall on the leaves, or pebbles may land there, but without noteworthy effect; a small insect, however, stimulates a copious flow of the fatal secretion. But there is also movement; for, when an insect is caught, the margin of the leaves slowly curl inwards for an hour or two, thus surrounding the booty, or shifting it nearer

the centre, in any case exposing it to more glands. After digestion, the results and the surplus exudation are absorbed, leaving finally the undigested skin of the insect on the more or less dry leaf-surface." It will be noted that this, in miniature, is almost exactly the process adopted by the Nicaraguan carnivorous creeper. If the species of insect-eating plants were very few in number, and were very sparsely found, it might be possible to regard them as mere *lusus naturæ*. There are, however, known to be several hundred dicotyledons which, in some way or other, catch and live on animal food. From such a basis the evolution of a giant and man-eating dicotyledon is within the bonnds of possibility. We cannot help hoping very mnch that the story of the Vampire Vine will turn out to be true, for if it does, the botanists will be able to try some very curious experiments as to how these vegetables which are half animals, digest, and whether their movements can properly be regarded as muscular movements. It is true that Darwin administered extremely homœopathic doses (·000095 of a milligramme) of nitrate of ammonia to a sundew, and found the plant responded to the drug exhibited; but it would be far easier to conduct experiments on a larger plant. Even as it is, we know that the insect-eating plants secrete not only an acid, but a "peptonising ferment" for the purposes of digestion. They also feed, like animals, "on substances at a high chemical level." More that a hundred and fifty years ago, Linnæus noted that the Lapps "used the butterwort for curding milk, a property due to a rennet-like ferment which the plant has in addition to the digestive or peptic." Again, we are told that Dr. Burdon Sanderson has "detected electric currents similar to those observed in the neuro-muscular activity of animals." The borderland between animal and plant life occupied by the insect-eaters is, indeed, one of the most curious and interesting fields of biological study; and if a plant as a large as the Vampire Vine could be obtained to experiment with, discoveries of enormous importance to science might very likely be made. The Vampire Vine would doubtless stand a grain of calomel after a heavy meat meal without damage or annoyance.—*(Spectator.)*

Tombak

Is a narcotic, which is known under the name of *Nicotiana persica*, and is cultivated in Persia exclusively, in the provinces of Shiraz, Kechan, and Ispahan (says a writer in the *Kew Bulletin*). Its quality varies with the place of production. The best tombak is that which is derived from Shiraz. The production of this province varies between 1,500 and 2,000 bales a year, which is almost entirely consumed by members of the Imperial family. Tombak of this superior quality is not very abundant and the

price paid for it is about 50*f.* or 60*f.* the oke, the oke being equivalent to 2·8lbs. avoirdupois. The province of Kechan produces the second quality of Persian tombak. With small leaves like the Shiraz tombak, the product of Kechan is not even so abundant. The province of Isphahan is the centre of the product for exportation. Its cultivation is carried on on a large scale, and the plant which has a large leaf, forms the third quality of Persian tombak. It has been vainly endeavoured to grow this plant in other localities of Persia and Turkey, and experiments which have been made in growing Shiraz tombak in the districts of Ispahan and Kechan kave not been attended with successful results. This is attributed to the quality of the soil. Tombak, which is used in the same way as tobacco, is cultivated in a manner almost identical with that followed in tobacco cultivation. The seeds are sown in the month of May, and as soon as the young plants have attained a height of from 15 to 20 centimetres they are watered once a fortnight. The harvest takes place in September or December, when the leaves are cut and spread upon the ground where they are exposed to the dew for a period of 48 hours, and to this exposure they owe the fact of their being slightly stained with little black patches on the leaves. When carried to the warehouses the leaves are piled one upon the other. A slight smoking to which they are subjected in the warehouses gives to the leaves a greenish tint. The warehouses are then carefully closed so as to exclude all air, and at the expiration of a fortnight the leaves are sorted and packed. In the latter operation the following is the method employed. After having separated the leaves one by one, they are placed one upon the other, and pressed in bundles of from 40 to 42 okes. They are then wrapped in pieces of American cloth, which are stretched and sewn up in the form of bales, called torba. These torba, which are covered with sheepskins, half dressed, are then ready for delivery to the trade. Tombak in good condition packed in bales and warehoused in places not too dry, may be kept without any deterioration for several years.—(*Indian Agriculturist.*)

VI. TIMBER AND PRODUCE TRADES.

Churchill and Sim's Wood Circular

of December 3rd, 1891.

EAST INDIA TEAK.—A good delivery of 1,020 loads in November, against 882 loads in November last year, and 1,080 in November, 1889, brings the consumption for the first eleven months of this year to 13,341 loads, against 15,382 loads, and 14,320 loads respectively, in the same period of 1890 and 1889. A great jump in the price of what floating cargoes are still available, is the consequence of a drought in Siam, which has caused an almost total cessation for the present of the arrival of timber in the shipping ports of that country. Holders of the wood here are therefore very firm, believing that a considerable period of time must elapse before this trade can resume its usual course.

SATINWOOD, EAST INDIA.—*Logs* are in good demand, the small parcel recently landed realized high prices, and further supplies are needed, but for *planks* and *boards* there is scarcely any enquiry.

EBONY, CEYLON,—Good wood is asked for and would sell well, but lower qualities,of which present stock chiefly consists, are difficult to clear. EAST INDIA.—The stock is moderate, demand quiet, aud sales small.

ROSEWOOD.—There is a fair demand and moderate imports could be placed without difficulty.

Price Current.

Indian Teak	per load,	£9-10s.	to £15
Cedar, Malabar	per sup. ft.	3½d.	to 4d.
Satinwood, Indian	per ton	£8	to £12
Rosewood, Indian	„ „	£8	to £12
Ebony, Indian	„ „	£10	to £12
Boxwood	„ „	£4	to £13

LONDON PRODUCE SALES

December, 1891.

Cutch, fair to fair dry ...	per cwt.	24s.	to 32s. 6d.
Gum Arabic, Madras, Dark to fine pale	„ „	15s.	to 50s.
Myrabolams, good and fine, pale ...	„ „	11s.	to 13s.
Nux Vomica, good ...	„ „	11s.	to 13s. 6d.
Sandalwood { logs ...	„ ton	£35	to £60
Sandalwood { chips ...	„ „	£9	to £30

VIII.—EXTRACTS FROM OFFICIAL GAZETTES.

1.—Gazette of India.—

30th November 1891.—No. 1286-F.—With reference to the Notification of this Department, No. 926-F., dated the 12th August last, Mr. J. Nisbet, officiating Conservator of Forests, 3rd grade, Upper Burma Circle, Burma, reverted to his substantive appointment of Deputy Conservator, 2nd grade, Burma, on 22nd November 1891, the date of return to duty from privilege leave of Mr. J. W. Oliver, Conservator, 3rd (officiating 1st) grade.

29th December 1891.—No. 1348 F.—With reference to paragraph 12 of the Circular Resolution of this Department, No. 30 F., dated the 29th instant, the following appointments and transfers of Forest Officers are made in the interests of the public service :—

Mr. E. E. Fernandez, late Deputy Director of the Forest School at Dehra Dun (on deputation to the Baroda State). to be a Deputy Conservator of the 1st grade in Assam (*seconded*)

Mr. J. T. Jellicoe, Deputy Conservator, 1st grade, Assam—to Burma.

Mr. J. C. McDonell, Deputy Conservator, 1st grade, Punjab (on deputation to Kashmir)—to the Central Provinces (*seconded*).

Mr. W. E. D'Arcy, Deputy Conservator, 3rd grade, Punjab—to Assam, as Deputy Conservator, 2nd grade, but to continue as Officiating Conservator of the Central Circle in the North-Western Provinces and Oudh.

Mr. E. G. Chester, Deputy Conservator, 3rd grade, Andamans—to Bengal, as Deputy Conservator, 2nd grade.

Mr. W. M. Green, Deputy Conservator, 3rd grade, Bengal—to Burma.

Mr. A. J. Mein, Deputy Conservator, 3rd grade, Assam (on furlough)—to the Punjab.

Mr. A. M. Reuther, Deputy Conservator, 4th grade, Punjab—to Assam.

Mr. E. A. Down, Deputy Conservator, 4th grade (sub. *pro tem.* 3rd grade), Punjab—to the North-Western Provinces and Oudh, as Deputy Conservator, 4th grade (officiating 3rd grade).

Mr. J. L. Pigot, Assistant Conservator, 1st grade (Deputy Conservator, 4th grade, sub. *pro tem*), Punjab—to the Central Provinces, as Deputy Conservator, 4th grade, but to continue as Assistant Inspector General of Forests and Superintendent of Working-Plans (*seconded*).

Mr. A. F. Gradon, Assistant Conservator, 2nd grade (officiating 1st grade), Central Provinces—to Burma, as Assistant Conservator, 1st grade, and officiating 4th grade Deputy Conservator, but to continue as Instructor at the Forest School (*seconded*).

Mr. J. E. Barrett, Assistant Conservator, 2nd grade, Punjab—to Assam, as Assistant Conservator, 1st grade.

Mr. C. P. Fisher, Assistant Conservator, 2nd grade, Assam—to the Punjab.

2.—MADRAS GAZETTE :—

26th November Leave.—The twenty days' privilege leave granted to V. P. Ramalingam Pillai, Ranger, First Class, Nilgiri District, from 3rd November 1891, is approved and sanctioned.

4th December 1891.—No. 537.—The appointments of Messrs. E. P. Popert, J. W. Cherry and E. D. M. Hooper as Conservators of Forests, notified at page 1132, Part I of the *Fort St. George Gazette*, dated 17th November 1891, take effect from the forenoon of Wednesday the 21st October 1891.

7th December 1891.—No. 535.—M. R. Ry. Dilli Jagannadha Rao Pantulu Garu, Special Forest Settlement Officer, Kurnool, Godavari and Kistna Districts, privilege leave for two months and twenty-eight days, under article 291 of the Civil Service Regulations.

3.—BOMBAY GAZETTE :—

4th December 1891.—Messrs. K. B. Phadke and W. A. Wallinger respectively delivered over and received charge of the Sub-Division Forest Office, Nasik, on the 17th ultimo, after office hours.

7th December 1891.—No. 8455.—His Excellency the Governor in Council is pleased to appoint Mr. G. P. Millett to be Divisional Forest Officer, North Thana, and Mr. L. S. Osmaston to be Divisional Forest Officer, South Thana.

7th December 1891.—Messrs. G. P. Millett, Deputy Conservator of Forests, and K. B. Phadke respectively delivered over and received charge of the South Sub-Division Forest Office, South Thana, on the 27th ultimo, before office hours.

Messrs. G. P. Millett, Deputy Conservator of Forests, and K. B. Phadke respectively delivered over and received charge of the North Sub-Division Forest Office, South Thana, on the 27th ultimo, before office hours.

23rd December 1891.—Messrs. G. P. Millett, Deputy Conservator of Forests, and L. S. Osmaston, Assistant Conservator of Forests, respectively delivered over and received charge of the Divisional Forest Office, South Thana, on the 16th instant, after office hours.

16th December No. 4384.—Mr. H. Mainwaring, Deputy Conservator of Forests, has been allowed by Her Majesty's Secretary of State for India an extension of leave on medical certificate for four months.

4.—BENGAL GAZETTE :—

12th December 1891.—No. 3746 F.—Mr. F. C. Henvey, Assistant Conservator of Forests, on return from the two months' examination leave granted to him in the notification of this Department, dated the 5th October, 1891, is posted to the Jalpaiguri Forest Division for special duty in connection with the preparation of Working-Plans.

Mr. Henvey joined his appointment on the forenoon of the 9th November, 1891.

19th December 1891.—No. 3868 F.—Mr. F. Trafford, who has recently been appointed by Her Majesty's Secretary of State for India to the Forest Department, Bengal, is posted to the Singbhum Forest Division.

29th December, 1891.—No. 3929 F.—In modification of the orders contained in the notification, dated the 6th July, 1891, and 11th September, 1891, published at pages 767 and 836, Part I of the *Calcutta Gazette*, dated, respectively, the 12th August and 16th September, 1891, the following changes in the Upper Controlling Staff of the Forest Department in Bengal are hereby ordered :—

Mr. R. H. M. Ellis, Officiating Deputy Conservator, first grade, to continue to officiate in that grade, with effect from the 4th May, 1891, *vice* Mr. H. H. Davis, Deputy Conservator, first grade, on furlough.

Mr. G. A. Richardson, Deputy Conservator, third grade, to officiate in the second grade of Deputy Conservators, with effect from the 4th May, 1891, to the 30th September, 1891 (both days inclusive).

Mr. E. G. Chester, Deputy Conservator, third grade, to officiate in the second grade of Deputy Conservators, with effect from the 1st October, 1891 (*vide* notification dated the 28th October, 1891).

Mr. C. A. G. Lillingston, Deputy Conservator, fourth grade, to officiate in the third grade of Deputy Conservators with effect from the 4th May, 1891.

Mr. R. L. Heinig, Assistant Conservator, first grade, to officiate in the fourth grade of Deputy Conservators, with effect from the 4th May, 1891.

Mr. H. H. Haines, Assistant Conservator, second grade, to officiate in the first grade of Assistant Conservators, with effect from the above-mentioned date.

Consequent on the grant of three months' privilege leave to Mr. W. M. Green, Deputy Conservator, third grade, with effect from the 9th May, 1891, the following temporary promotions are made from that date :—

Mr. M. S. Fowler, Deputy Conservator, fourth grade, to officiate in the third grade of Deputy Conservators.

Mr. C. G. Rogers, Assistant Conservator, first grade (on deputation to the Dehra Dun Forest School), to officiate in the fourth grade of Deputy Conservators (*seconded*).

Mr. H. D. D. French, Assistant Conservator, first grade, sub. *pro tem.*, to officiate in the fourth grade of Deputy Conservators, *vice* Mr. Rogers, on deputation (*seconded*).

Mr. W. H. Lovegrove, Assistant Conservator, second grade, to officiate in the first grade of Assistant Conservators, *vice* Mr. French.

Consequent on the grant, with effect from the 2nd July, 1891, of nine months' leave on medical certificate out of India to Mr. M. S. Fowler, Officiating Deputy Conservator, third grade, the following temporary promotions are hereby sanctioned :—

Mr. R. L. Heinig, Assistant Conservator, first grade, and Officiating Deputy Conservator, fourth grade, to officiate as Deputy Conservator, third grade.

Mr. H. H. Haines, Officiating Assistant Conservator, first grade, to officiate in the fourth grade of Deputy Conservators.

Consequent on the death of Mr. Fowler, Deputy Conservator, fourth grade, the following promotions are ordered, with effect from the 31st July, 1891 :—

Mr. R. L. Heinig, Assistant Conservator, first grade, and Officiating Deputy Conservator, fourth grade, is confirmed in the latter

grade, but will continue to officiate in the third grade of Deputy Conservators.

Mr. C. G. Rogers, Assistant Conservator, first grade (on deputation), will continue to officiate in the fourth grade of Deputy Conservators, *vice* Mr. Lillingston.

Mr. H. D. D. French, Assistant Conservator, first grade, sub. *pro tem*, is confirmed in that grade, *vice* Mr. Heinig, but will continue to act in the fourth grade of Deputy Conservators, *vice* Mr. Rogers (*seconded*).

Mr. H. H. Haines, Assistant Conservator, second grade, and Officiating Deputy Conservator, fourth grade, to the first grade of Assistant Conservators sub. *pro tem.*, *vice* Mr Rogers (*seconded*), but will continue to act in the fourth grade of Deputy Conservators in the chain of Mr. Green, *vice* Mr. French appointed to act in that grade, *vice* Mr. Rogers in the chain of Mr. Davis.

Consequent on the return of Mr. W. M. Green, Deputy Conservator, third grade, from the three months' privilege leave granted to him in the notification, dated the 24th April, 1891, the following reversions are ordered, with effect from the 9th August, 1891 :—

Mr. R. L. Heinig, Officiating Deputy Conservator, third grade, to revert to his substantive appointment of Deputy Conservator, fourth grade.

Mr. H. H. Haines, Officiating Deputy Conservator, fourth grade, to revert to Assistant Conservator, first grade, sub. *pro tem.*

29*th December*, 1891.—No. 3930F.—Mr. H. H. Haines, Assistant Conservator first grade sub. *pro tem.*, officiated in the fourth grade of Deputy Conservators, with effect from the 9th August, 1891, to the date of expiry of the privilege leave granted to Mr. H. D. D. French, Officiating Deputy Conservator, fourth grade.

5.—N-W. Provinces and Oudh :—

2nd December 1891—No. 5921—With effect from the 1st October 1891, the date on which Mr. L. Mercer, Officiating Deputy Conservator of Forests, returned from privilege leave and resumed charge of the Saharanpur Division, Mr. A. P. Grenfell Assistant Conservator, of Forests in charge of the Saharanpur Forest Division, reverted to the Dehra Dun Forest Division, to which he is attached.

7th December 1891.—No 929F—Under section 4 *(c)* of the Indian Forest Act, VII of 1878, Pandit Bhawani Dat Joshi, Deputy Collector, is appointed Forest Settlement Officer in connection with the settlement of rights and privileges in the Government of the Kumaun Division ; and under section 16 of the said Act the Commissioner of the Kumaun Division is empowered to hear any appeals that may be preferred from the orders of the Forest Settlement Officer.

6—PUNJAB GAZETTE :—

5th December 1891. *No.* 433.—Under the provisions of paragraph 11 of the Circular of the Government of India No. 18 F., dated 29th July 1891, His Honor the Lieutenant-Governor is pleased to make the following appointments to the Punjab Forest service, with effect from the 1st December 1891 :—

1. Mr. C. F. Rossiter, Sub-Assistant Conservator, to be Extra Assistant Conservator, 2nd Grade, on Rs. 300.
2. Bhai Ladha Sing, } Sub-Assistant Conservator, to be Extra
3. Munshi Fazal Din, I, } Assistant Conservators, 3rd Grade,
4. Lala Jowala Proshad, } on Rs 250.
5. Munshi Fazal Din, II, { Forest Ranger, to be Extra Assistant Conservator, 4th Grade, on Rs. 200.

11*th December*, 1891 *No.* 440.—Messrs. E. Forrest and E. A. Down, Deputy Conservators of Forests, respectively made over and assumed charge of the Umballa Forest Division on the forenoon of the 4th December 1891.

12*th December*, 1891 *No.* 449.—Messrs. J. H. Lace and G. G. Minniken, Deputy Conservators of Forests, respectively assumed and made over charge of Bashahr Forest Division on the afternoon of the 30th November 1891 consequent on the deputation to the Patiala State of the latter.

19*th December*, 1891 *No.* 462.—Messrs. E. Forrest and E A. Down, Deputy Conservators of Forests, respectively received and made over charge of the Umballa Forest Division on the forenoon of the 4th December 1891.

Punjab Government Gazette Notification No. 440, dated the 11th December 1891, is hereby cancelled.

Erratum.—In *Punjab Government Gazette* Notification No. 433, dated 5th December 1891, publishing certain appointments to the Punjab Forest Service, *for* "with effect from the 1st December 1891" *read* "with effect from the 1st November 1891."

7—CENTERAL PROVINCES GAZETTE :—

19*th December*, 1891 *No.* 8616.—The under-mentioned officers and persons are declared to have passed the prescribed Departmental Examination in the subjects and by the standards noted below :—

IN FOREST LAW.

Mr. A. Hunt, Forest Ranger.

23*rd December* 1891, *No.* 8752.—Leave on medical certificate for twelve months, under Article 343 of the Civil Service Regulations is granted to Mr. F.S.Barker ,Forest Divisional Officer, Betul, with effect from the date on which he may avail himself of it.

No. 8753.—Mr. A. M. F. Caccia, Forest Divisional Officer, is transferred to Narsinghpur, is transferred to Betul.

No. 8754.—Mr. Chunder Kumar Chatterji, Extra-Assistant Conservator of Forests, Hoshangabad, is tranferred to Narsingh Forest Divisional Officer.

30th December No. 8843.—Mr. V. S. Menzies, Assistant Comservator, attached to the Chanda Forest Division is posted to the Nagpur Wardha Division.

No. 8844.—Mr. N. C. McLeod, Sub-Assistant Conservator, on being relieved of the charge of the Nagpur-Wardha Forest Division, is posted to the Bhandara Forest Division.

No. 8845.—Mr. P. H. Clutterbuck, Assistant Conservator, on being relieved of the charge of the Bhandara Forest Division, is posted to the Chanda Forest Division, for employment in the Pranhita-Godavari Sub-Division.

No. 8846.—With reference to Notification No. 8843, dated the 30th instant, Mr. V. S. Menzies, Assistant Conservator, assumed charge of the Nagpur-Wardha Forest Division from Mr. N. C. McLeod, Sub-Assistant Conservator, on the afternoon of the 15th December 1891.

No. 8853.—The following promotions among Forest Rangers in the Northern Circle are ordered, with affect from the dates specified :—

Mr. A. T. C. Howell, Forest Ranger, 5th grade, to the 4th grade, with effect from the 1st October 1891.

Faiz Baksh, Forest Ranger, 6th grade, to the 5th grade, with effect from the 1st August 1891.

No. 8854.—The following promotions among Forest Rangers in the Northern Circle are ordered, with effect from the 1st October 1891 :—

Faiz Baksh, Forest Ranger, 5th grade, to the 4th grade.

Mr. C. W. Anderson, Forest Ranger, 6th grade to the 4th grade.

Srideo Bajpai, Forest Ranger, 6th grade, to the 5th grade.

8—Burma Gazette :—

1st December 1891.—No. 291.—The following reversons are ordered in the Forest Department, with effect from the date on which Mr J. W. Oliver resumed charge of the Upper Burma Forest Cirele from Mr. J. Nisbet :—

Mr. J. Nisbet, Deputy Conservator of Forests, 2nd grade, officiating Conservator of Forests, 3rd grade, to officiate as Deputy Conservator 1st grade.

Mr. C. W. Palmer, officiating Deputy Conservator, 1st grade, to revert to his substantive rank.

Mr H. B. Ward, officiating Deputy Conservator, 2nd grade, to revert to his substantive rank.

Mr. C. E. Muriel, officiating Deputy Conservator, 3rd grade, to revert to his substantive rank.

3rd December 1891.—No. 11.—With reference to Revenue Department Notification No. 273F., dated the 25th ultimo, Mr. W. F. L. Cottenham, Assistant Conservator of Forests, made over, and Mr. J. Nisbet, Deputy Conservator of Forests, resumed charge of the Ranoon division on the afternoon of the 28th November 1891.

No. 12.—With reference to the Notification above quoted Mr. W. F. L. Cottenham, Assistant Conservator of Forests, assumed charge of duties in the Tharrawaddy division on the forenoon of the 30th November 1891.

3rd Deeember—No. 270.—At the examinations held at Mandalay, Bhamo, and Mônywa on the 2nd November 1891 the following Forest Officers passed the examination in Forest Law and Revenue :—

Mr. C. W. A. Bruce, Assistant Conservator.
Mr. C. W. Allan, Extra Assistant Conservator.
Mr. D. L K. Calderwood, Extra Assistant Conservator.

4th December 1891.—No. 294.—The following promotion is ordered :—

Mr. E. M Buchanan, Extra Assistant Conservator of Forests, 2nd grade, to be Extra Assistant Conservator, 1st grade.

29th December 1891 —No. 322.—The following promotions are ordered with effect from the 2nd November 1891 :—

Messrs. Herbert Carter, E. A. O'Bryen, and W. F. L. Tottenham, Assistant Conservators of Forests, 2nd grade, to be Assistant Conservators, 1st grade.

30th December 1891.—No. 323.—Under the provisions of section 6 (*c*) of the Burma Forest Act, 1881, the Chief Commissioner appoints Maung Po We, officiating Myoôk, Payagale township, Pegu district, to succeed Maung Shwe as the Forest Settlement Officer to enquire into and determine the existence, nature, and extent of any rights claimed by, or alleged to exist in favour of any person in or over any land comprised within the limits specified in Revenue Department Notification No. 237, dated the 13th October 1891, and any claims relating to the practice within the said limits of taungya cultivation, and to deal with the same as provided in Chapter II of the Burma Forest Act, 1881.

9.—Assam Gazette :—

30th November 1891.—No. 9989G.—With effect from the 1st September 1891.—

Mr. J. C. Kelly, Sub-Assistant Conservator, Second Grade, to be Extra Assistant Conservator, Second Grade.

Babu Jogesvar Sur, Sub-Assistant Conservator, Third Grade, to be Extra Assistant Conservator, Third Grade.

Babu Tarakisor Gupta, Sub-Assistant Conservator, Third Grade, to be Extra Assistant Conservator, Fourth Grade.

10th December 1891.—No. 10,399G —Mr. T. J. Campbell, Assistant Conservator of Forests, received charge of the Goalpara Forest Division from Mr. D. P. Copeland, Deputy Conservator of Forests, on the forenoon of the 16th November 1891.

24th December 1891.—No. 1,0,813G.—The services of Babu Upendra Nath Kanjilal, Forest Ranger, Assam, are placed at the disposal of the Government of India, Revenue and Agricultural Department, for employment as Vernacular Instructor at the Imperial Forest School, Dehra Dun.

26th December 1891.—No. 10,821G.—Mr. T. J. Campbell, Assistant Conservator of Forests, having reported his return to duty on the forenoon of the 28th October 1891, the unexpired portion of the furlough granted to him in Notification No. 8,575G., dated the 14th October 1890, is cancelled.

26th December 1891.—No. 10,822G.—Mr. D P. Copeland, Deputy Conservator of Forests, in charge of the Kamrup Forest Division, is placed in charge of the Darrang Forest Division, in addition to his own duties, until further orders.

31st December 891.—No. 11015G.—Mr. W. F. Lloyd, Assistant Conservator of Forests, Second Grade, is appointed to officiate in the First Grade of Assistant Conservators of Forests, with effect from the 15th November 1891.

10.—HYDERABAD RESIDENCY GAZETTE :—

1*st December* 1891 No. 302. Mr. S. Shrinivasulu Naidu, a passed student of the Forest School at Dehra Dun. is appointed, on probation, to be Sub- Assistant Conservator of Forests in Berar on Rs. 100 per mensem, with effect from the 5th May 1891.

Mr. Shrinivasulu is posted for duty in the Basim district under the orders of the District Forest Officer, Basim.

11.—MYSORE STATE GAZETTE :—

16*th December* 1891.—No. 357.—The following transfers and promotion of Forest Officers have been approved and sanctioned :—

Transfers.

1. Mr. B. Ramaswami Iyer, Officiating Assistant Conservator of Forests, from Mysore to Kadur District.
2. Mr. Y. Sitaramaiya, Assistant Conservator of Forests, from Kadur to the Mysore District.
3. Mr. E P Lovery, Officiating Superintendent of Forests, from Shimoga to the Bangalore District.
4. Mr C Narayana Rao, Assistant Conservator of Forests, from Bangalore to the Shimoga District.
5. Mr. S. A. Bapu Rao, Assistant Conservator in charge of Plantations, to the Hassan District.
6. Mr. H. Muttappa, Sub-Assistant Conservator of Forests, from Hassan to the Tumkur District.
7. Mr. B. Srinivas Rao, Sub-Assistant Conservator of Forests, from Tumkur to the Kolar District.

Promotion.

Mr. G. Ricketts, Forest Probationer attached to the Head-quarters, to the Grade of Sub-Assistant Conservator of Forests and to be in charge of the Plantation Department.